

# How chiropractors may influence immunity: Zinc supplementation. A speed update of the literature

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**Abstract: Objective** - To review the top 6 relevant papers regarding zinc and immune function.

**Discussion** - The chiropractor's perspective is upheld that zinc supplementation may assist with the body's immune function. It is acknowledged that the formal scientific literature remains cautious but is favourable to the idea that in clinical terms, there is no harm and possible benefit for guiding patients to consider zinc supplementation.

**Conclusion** - Chiropractors should consider the benefits of zinc supplementation in these days of virulent respiratory infection. There is a very little risk of any adverse event related to such a recommendation.

**Indexing Terms:** chiropractic; immunity; zinc; COVID, Zinc Tally Test.

## Introduction

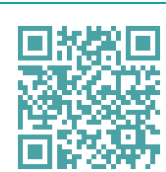
Conventional chiropractors are aware of a negative skew to the left which I have reported (1) and where a very small minority hold a minimalist view of chiropractic solely as a therapy for back pain and headache. The greater majority (>70%) understand that chiropractic is not a therapy but a system of health care, as held by luminaries of the profession such as Janse, Watkins, and Homewood. (2)

The important matter we must collectively be considering at this time in our care of patients in this hyper-sensitive 'COVID' era (C-19) is how to best assist their immunity. It is not for this paper to comment on the politics or otherwise of the situation our profession finds itself in.

This *Journal* was established by clinicians for clinicians and our sole objective aligns with our Three Pillars of Freedom, Truth, and Health. To serve this purpose we present a summation paper that brings the truth as we know it through responsible scientific investigation for the purpose of you better guiding your patient to health. Given we are discussing immunity, we may call this '*defensive health*'.

We celebrate our freedom to bring this update even though it flies against Big Pharma and their heavily paid-for narrative to the contrary.

... It could be considered negligent for a chiropractor to not consider the risk-benefit ratio of zinc supplementation to assist immune function. ...'



1. Ebrall P. The conventional identity of chiropractic and its negative skew. *J Contemp Chiropr.* 2020;3(1):111-26. URL <https://journal.parker.edu/index.php/jcc/article/view/133>

2. Murphy DR, Wyatt LH, Perle SM, Hyde T. The Necessary Future of Chiropractic Education: A North American Perspective. *Chirobase.* Accessed 3 November 2022. URL <https://quackwatch.org/chiropractic/edu/wyatt/>

## The papers

**Cite:** Sanna A, Firinu D, Zavattari P, Valera P. Zinc Status and Autoimmunity: A Systematic Review and Meta-Analysis. *Nutrients*. 2018 Jan 11;10(1):68. DOI 10.3390/nu10010068. PMID: 29324654; PMCID: PMC5793296.

Sanna et al consider zinc to be an essential trace element for living organisms and their biological processes, stating it plays a key role in more than 300 enzymes and it is involved in cell communication, proliferation, differentiation and survival.

It is also known that zinc plays a role in regulating the immune system with implications in pathologies where zinc deficiency and inflammation are observed. Sanna et al continue *'in order to examine the experimental evidence reported in the literature regarding zinc levels in the body of patients with autoimmune disorders compared to control individuals, a systematic review and meta-analysis were performed. From 26,095 articles identified by literature search, only 179 of them were considered potentially relevant for our study and then examined. Of the 179 articles, only 62 satisfied the inclusion criteria.'*

This is a reasonable number of papers to include in a Systematic Review and lends weight to their findings that *'particularly for Fixed Model, Zn concentration in both serum (mean effect = -1.19; confidence interval: -1.26 to -1.11) and plasma (mean effect = -3.97; confidence interval: -4.08 to -3.87) samples of autoimmune disease patients was significantly lower than in controls.'*

What this tells us, as concluded by the authors, is that there is *'a deficiency of zinc in serum and plasma of patients compared to controls'* where the patients are people with autoimmune disorders. This finding may not allow a jump to conclude that ensuring a reasonable plasma level of zinc will prevent anything, especially a viral infection such as from the C-19 virus, it does tell us that there is an association between zinc intake, hence plasma levels, and the status of the immune system.

This paper is free-to-read through PMC at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5793296/pdf/nutrients-10-00068.pdf>

**Cite:** Read SA, Obeid S, Ahlenstiel C, Ahlenstiel G. The Role of Zinc in Antiviral Immunity. *Adv Nutr*. 2019 Jul 1;10(4):696-710. DOI 10.1093/advances/nmz013. PMID: 31305906; PMCID: PMC6628855.

The extension of Sanna et al's work is found in this paper which *'summarises current basic science and clinical evidence examining zinc as a direct antiviral, as well as a stimulant of antiviral immunity.'*

Read at all report that *'an abundance of evidence has accumulated over the past 50y to demonstrate the antiviral activity of zinc against a variety of viruses, and via numerous mechanisms'* and conclude that *'the therapeutic use of zinc for viral infections such as herpes simplex virus and the common cold has stemmed from these findings'*.

They fail to be definitive, finding that *'there remains much to be learned regarding the antiviral mechanisms and clinical benefit of zinc supplementation as a preventative and therapeutic treatment for viral infections.'* They report *'human plasma zinc, for example, ranges from approximately 10 to 18  $\mu$ M, whereas antiviral concentrations of zinc can reach into mM concentrations. Intracellular zinc concentrations range from 10s to 100s of  $\mu$ M, but are significantly buffered by zinc-binding proteins such as metallothioneins, rendering free zinc concentrations at picomolar to low nanomolar concentrations. The antiviral properties of zinc are certainly virus-specific, but it would appear that zinc ion availability plays a significant role in the antiviral efficacy of zinc'*.

With caution the authors report *'severe acute respiratory syndrome (SARS) coronavirus RdRp template binding and elongation was inhibited by zinc in Vero-E6 cells (60). Moreover, zinc salts were shown to inhibit respiratory syncytial virus, even while zinc was incubated with HEp-2 cells only before infection, and then removed.'*

The question of zinc supplementation around the time of vaccination remains open, however the authors state *'comparable studies of supplementation with zinc before vaccination have produced similar disappointing results. Zinc supplementation did not improve seroconversion following administration of the oral poliovirus vaccine in infants, nor did it improve the immunological response to HBV or influenza vaccination in the elderly. Although there remains little evidence that zinc improves viral vaccination responses, a small number of studies suggest that zinc may improve antibody titers and antibacterial responses to pneumococcus and cholera infections.'*

This paper is free-to-read through PMC at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6628855/>

**Cite:** Bonaventura P, Benedetti G, Albarède F, Miossec P. Zinc and its role in immunity and inflammation. *Autoimmun Rev.* 2015 Apr;14(4):277-85. DOI 10.1016/j.autrev.2014.11.008. Epub 2014 Nov 24. PMID: 25462582.

The authors explain that *'zinc functions as a modulator of the immune response through its availability, which is tightly regulated by several transporters and regulators. When this mechanism is disturbed, Zn availability is reduced, altering survival, proliferation and differentiation of the cells of different organs and systems and, in particular, cells of the immune system. Zn deficiency affects cells involved in both innate and adaptive immunity at the survival, proliferation and maturation levels.'*

What that means is that *'the balance between the different T helper cell subsets are particularly susceptible to changes in zinc status.'* Bonaventura et al's conclusion is emphatic, *'acute zinc deficiency causes a decrease in innate and adaptive immunity, [and] chronic deficiency increases inflammation.'*

This paper is available for purchase through Elsevier.

**Cite:** Maywald M, Wessels I, Rink L. Zinc Signals and Immunity. *Int J Mol Sci.* 2017 Oct 24;18(10):2222. DOI 10.3390/ijms18102222. PMID: 29064429; PMCID: PMC5666901.

This paper provides a valuable perspective on the manner in which zinc functions within the body. From their abstract we note Maywald et al consider that *'zinc deficiency as well as zinc excess result in severe disturbances in immune cell numbers and activities, which can result in increased susceptibility to infections and development of especially inflammatory diseases.'*

The purpose of this paper is to focus on *'the role of zinc in regulating intracellular signalling pathways in innate as well as adaptive immune cells.'* They discuss the main underlying molecular mechanisms and targets affected by altered zinc homeostasis, including kinases, caspases, phosphatases, and phosphodiesterases.

The most interesting discussion is about *'the interplay of zinc homeostasis and the redox metabolism in affecting intracellular signaling.'* The key signalling pathways that are described in detail talk about the *'effects of fast zinc flux, taking place within a few seconds to minutes will be distinguish from slower types of zinc signals, also designated as "zinc waves", and late homeostatic zinc signals regarding prolonged changes in intracellular zinc.'*

This paper is free-to-read through PMC at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5666901/>

**Cite:** Maares M, Haase H. Zinc and immunity: An essential interrelation. Arch Biochem Biophys. 2016 Dec 1;611:58-65. doi: 10.1016/j.abb.2016.03.022. Epub 2016 Mar 26. PMID: 27021581.

This is another 'pay to view' review paper through Elsevier, dated 2016, but gives a good overview of interrelation between zinc and immunity.

The abstract reads '*The significance of the essential trace element zinc for immune function has been known for several decades. Zinc deficiency affects immune cells, resulting in altered host defense, increased risk of inflammation, and even death. The micronutrient zinc is important for maintenance and development of immune cells of both the innate and adaptive immune system. A disrupted zinc homeostasis affects these cells, leading to impaired formation, activation, and maturation of lymphocytes, disturbed intercellular communication via cytokines, and weakened innate host defense via phagocytosis and oxidative burst. This review outlines the connection between zinc and immunity by giving a survey on the major roles of zinc in immune cell function, and their potential consequences in vivo.*

**Cite:** Hunter J, Arentz S, Goldenberg J, et al Zinc for the prevention or treatment of acute viral respiratory tract infections in adults: a rapid systematic review and meta-analysis of randomised controlled trials BMJ Open 2021;11:e047474. DOI 10.1136/bmjopen-2020-047474

This is the most recent paper on the topic of zinc and immunity. It is a robust review by Australians Hunter et al who searched 17 English and Chinese databases in April/May 2020, using Cochrane Rapid Methods. They identified 28 RCTs with a total of 5,446 participants.

They found '*compared with placebo, oral or intranasal zinc prevented 5 RTIs per 100 person-months (95% CI 1 to 8, numbers needed to treat (NNT)=20, moderate-certainty/quality).*' Of relevance to another study reported above, Hunter et al reported '*sublingual zinc did not prevent clinical colds following human rhinovirus inoculations (relative risk, RR 0.96, 95% CI 0.77 to 1.21, moderate-certainty/quality).*'

However they did find that '*There were clinically significant reductions in day 3 symptom severity scores (mean difference, MD -1.20 points, 95% CI -0.66 to -1.74, low-certainty/quality), but not average daily symptom severity scores (standardised MD -0.15, 95% CI -0.43 to 0.13, low-certainty/quality). Non-serious adverse events (AEs) (eg, nausea, mouth/nasal irritation) were higher (RR 1.41, 95% CI 1.17 to 1.69, NNHarm=7, moderate-certainty/quality).*'

The Journal's interpretation agrees with their reported conclusion '*there was some evidence suggesting zinc might prevent RTIs symptoms and shorten duration. Non-serious AEs may limit tolerability for some.*'

Of greater relevance to our readers, Hunter et al found that '*the comparative efficacy/effectiveness of different zinc formulations and doses were unclear.*'

## Discussion

Given the 6 papers reported in this overview, there is a known empirical association between zinc levels within a patient and the function of their immune system. Hunter et al could not reach a firm conclusion which is understandable given their adherence to the biomedical standards of evidence perpetuated by the Cochrane group.

How does this translate to the practice of chiropractic?

The *Journal* would find it hard to see a regulatory body being concerned with the clinic use of zinc supplementation by a chiropractor. Having stated this it must be observed that the Australian body tends to lack reason and logic in the views it takes, however it would be on thin ice should it dare suggest that a member of the public could be harmed by a chiropractor recommending a patient consider zinc supplementation. We note at this point that Hunter et al did point to some AEs but specifically stated that '*no serious AEs were reported in the 25 RCTs that monitored them (low-certainty/quality)*'.

The question of whether or not a chiropractor should prescribe zinc supplementation to their patients is dependent on so many variables that the *Journal* can not take a position on this. We do note that generally, chiropractors do not '*prescribe*'.

It would seem that the most prudent clinical action remains for a chiropractor to inform their patients of up-to-date findings such as reported in this paper, and allow them to take their own decisions.

### The Zinc Tally Test

A simple means to obtain a clinical sense of a patient's '*zinc status*' is by the '*Zinc Tally Test*' or '*Zinc Taste Test*'. These are commercially available mixtures which form a '*taste test*' for the patient based on the phenomenon that '*diminished taste acuity (hypogeusia) has been linked to zinc deficiency in humans and animals.*' (3)

Suppliers of the test products are readily found by an on-line search; here are several: [Standard Process](#), [Better Health Clinic](#), [Melbourne Wellness](#), and [Metagenics](#). The *Journal* has no relationship with any named provider and notes the test is commonly used in naturopathy.

Melbourne Wellness state the following [on their website](#):

Zinc Tally was developed as a '*taste test*' for zinc adequacy. By swirling the Zinc Tally around in your mouth your naturopath can gauge by your taste response to the Tally how good or how bad your zinc levels are:

1. No flavor or '*like water*' = Chronic zinc deficiency
2. No flavor to begin with, but later a reaction occurs described as either '*dry*', '*fluffy*', '*mineral*', '*like baking powder*' or '*sweet*' = zinc deficiency
3. A strong but not necessarily unpleasant flavor is registered immediately and builds up little by little = no zinc deficiency.
4. An unpleasant flavor is registered immediately = no zinc deficiency, good zinc status

Naturopath [Liz Sheehan](#) also suggests the following may suggest zinc deficiency: '*white spots on your nails; poor immune function; stretch marks; skin rashes; fertility issues; low libido*'

Gruner and Arthur (3) reported that '*to date, there are no tests that are both sensitive and specific that accurately assess marginal zinc status in humans. The ZTT, albeit widely used, does not fill this void, and further research is needed.*'

The *Journal* acknowledges this view but also holds that the test is best used as one contributing factor to an overall clinical picture, in which case it is not used in a definitive manner, but an indicative manner. We note Zdilla et al (4) '*suggest that zinc sulfate taste acuity measurement may aid in the assessment of zinc nutriture among males*' and that in a cohort of

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3. Gruner T, Arthur R. The accuracy of the Zinc Taste Test method. *J Altern Complement Med.* 2012 Jun;18(6):541-50. DOI 10.1089/acm.2011.0298. PMID: 22784341.

4. Zdilla MJ, Saling JR, Starkey LD. Zinc sulfate taste acuity reflects dietary zinc intake in males. *Clin Nutr ESPEN.* 2016 Feb;11:e21-e25. DOI 10.1016/j.clnesp.2015.11.004. Epub 2016 Jan 14. PMID: 28531422.



pregnant women, Garg et al (5) report *'accuracy of zinc taste test in individual cases ranged between 70 and 100 percent. On the whole, zinc taste test was well correlated with serum zinc level, and provides a fair idea of zinc deficiency.'*

We caution clinicians to take into account the BMI of the patient on the basis of Feeney et al's finding (6) that *'taster perception was associated with BMI in women; nontasters had a higher mean BMI than medium tasters or supertasters.'*

For completeness, we report the work of Forsleff et al (7) to the effect that *'a novel oral zinc tally test (ZTT) used in the assessment of zinc status was administered to 100 Parkinson's Disease (PD) patients and 25 controls. Patients with PD showed a significantly decreased zinc status as compared to controls ( $p < 0.001$ ). Significance was also established for 3 self-reported health-related variables thought to be related to zinc status: vision problems, olfactory loss, and taste loss ( $p < 0.05$ ). Relative risks for patients with PD for these variables were 1.51, 1.56, and 1.33, respectively. Zinc status as measured by the ZTT is negatively correlated with PD status.'*

### Conclusion

The *Journal's* response to the question of whether chiropractic management can be beneficial to the patient in an environment where viral infections are common, is an emphatic 'yes'. We do not have to resort to explanations of how a spinal correction through an adjustment of subluxed vertebrae may be able to do this with its (beautiful) neurological mechanisms.

We are simply able to rely on the known science of immunity and its association with plasma levels of zinc.

A chiropractor could be considered negligent for not recommending zinc supplementation to their patients, especially at this time of C-19 viral infection.

We hasten to add that zinc levels are not a stand-alone defensive mechanism, they must be considered with a range of other basic nutritional and supplemental knowledge common to every chiropractor's basic training and the common practice of conventional chiropractic.

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5. Garg HK, Singal KC, Arshad Z. Zinc taste test in pregnant women and its correlation with serum zinc level. *Indian J Physiol Pharmacol.* 1993 Oct;37(4):318-22. PMID: 8112809.
6. Feeney E, O'Brien S, Scannell A, Markey A, Gibney ER. Genetic variation in taste perception: does it have a role in healthy eating? *Proc Nutr Soc.* 2011 Feb;70(1):135-43. DOI 10.1017/S0029665110003976. Epub 2010 Nov 22. PMID: 21092367.
7. Forsleff L, Schauss AG, Bier ID, Stuart S. Evidence of functional zinc deficiency in Parkinson's disease. *J Altern Complement Med.* 1999 Feb;5(1):57-64. DOI 10.1089/acm.1999.5.57. PMID: 10100031.

### *Disclaimer*

The author is immunocompromised following solid organ transplantation and the clinical benefit of medication to suppress rejection which of course suppresses immunity. My daily regime includes a supermarket brand of zinc tablet consisting of Pyridoxine Hydrochloride (Vitamin B6) 10mg, Manganese (from Manganese Amino Acid Chelate 20mg) 2mg, and Zinc (from Zinc Amino Acid Chelate 125mg) 25mg.

This paper was critically reviewed by two separate members of the *Editorial Board* and amended to reflect their advice.

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