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Preprint · April 2020

DOI: 10.13140/RG.2.2.18989.84964

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Iodine Intake to Reduce Covid-19 Transmission and Mortality

Iodine is known to deactivate coronavirus [very quickly at very low concentrations](#). Multiple [published scientific analyses](#) confirm that, to best fight any coronavirus, our iodine intake needs to attain the safe upper limit specified by the United Nations Food and Agricultural Organization. ([FAO](#)). That amount is much more than the FDA's Recommended Daily Allowance (RDA), which is the amount we currently average. The FAO dose is weight dependent at 30 micrograms of iodine per kilogram of body mass – 13mcg/lb. For a 60kg (176 lb) person the amount is 2400 micrograms.

Some of the world, uses iodine to sterilize touch surfaces and skin against covid. Some pacific rim countries already use oral iodine against covid. [Three countries](#) there are starting tests with an iodine nasal treatment against covid to give medical workers extra protection. The literature further reports that the reason that we, in the United States, are not already taking the higher dose or even hearing about iodine from the CDC, NIH or other U.S. medical sources is what they call “[iodophobia](#)”. This despite iodine being one of the World Health Organization's listed essential medicines and the CDC's [reference list](#) of covid disinfectants.

It is clear to me that use of iodine to protect ourselves will be a grassroots activity. We have already changed our behaviors multiple times to fight covid. Each of us can make one more, smaller change. Raise our daily iodine intake to the FAO safe upper limit (30mcg/kg). Most of us will have no negative side effects. Still, we can minimize the risk by using Lugol's Solution (a formulation not a particular brand), which is a specific form of iodine on the World Health Organization's List of Essential Medicines, the safest and most effective medicines needed in a health system.

To help reduce the need for social distancing and to reopen the economy, spread the word. The remainder of this paper provides [evidence](#), [answers](#) to frequently asked questions, and [dosing instructions](#).

Background. A prior technical report (Warren, 2020) discussed findings of an effort to identify existing, known, but overlooked and under-utilized approaches to help us defend against covid, with priority given to items that meet all of the following criteria:

- (1) Known to deactivate coronavirus,
- (2) Known role in relevant immune functions inside the body,
- (3) Known to be safe for people to take,
- (4) Broad availability at low cost,
- (5) No additional FDA approval required.
- (6) And a lack of contrary evidence.

Iodine was the only item found that met all of the criteria. Iodine use has two parts – intake for use inside the body, and external for touch surfaces, skin, etc. This paper addresses mostly intake, but does touch on related external use. Vitamin D and zinc were found to meet all except the sixth criterion. That doesn't make them useless against covid, just lower priority here. UV

light, ozone and copper touch surfaces were identified as having more application than has been publicized; that is also not discussed here.

The prior technical report provided the evidence that iodine met all six of the aforementioned criteria. It did not determine whether taking the FAO known safe amount would have real impact on covid. Still it did suggest raising iodine consumption within known safe limits, as potentially having benefit against covid. This paper adds details showing that increasing our iodine intake to the safe upper limit specified in United Nations documentation will very likely have strong benefit against covid.

How much iodine for covid? This effort explored two approaches to estimate how much iodine is needed to fight covid in the body. The United States iodine RDA for adults is 150 mcg and its UL is 1100mcg. The United Nations Food and Agriculture Organization documentation (FAO, 2001) makes clear that the 150 mcg RDA only regards iodine requirements for thyroid function. That same document specifies a safe upper limit for iodine intake as 30mcg/kg of weight which is higher than the United States UL for adults heavier than 80-pounds.

One approach taken to estimate the necessary iodine intake was to search the literature specifically for work that already determined an upper bound for that amount. The other approach was to compute the amount of iodine needed to perform the three particular body functions for which iodine is known to be needed to fight covid:

1. Deactivation of covid in the nose by the presence of enough iodine in the nasal mucus.
2. Iodine in sweat to deactivate covid on skin before it can enter the body.
3. Participation in apoptosis to kill cells infected with covid to stop the cells replicating the covid virus.

The above list of functions is not the full set of addition roles for iodine in the body. Technical details regarding the full range of body's uses of iodine are available at (Aceves, et al., 2013) and (Rychlik, 2017) and also at references therein. Less technical summaries of some of those uses iodine are available at (Derry, 2009) and (Rondon, 2019).

The reference (Aceves, et al., 2013) directly estimates that the total iodine required to support all functions is least 3 mg/day for certain pathologies. Another reference (Rychlik, 2017) that examines the iodine requirements to support all functions recommends, "In order to maintain optimum health, adults need 2-5 mg of iodide daily." That reference further notes that their recommendation is in line with "upper safe limit of dietary intake of iodine established by FAO (30 mcg/kg/day)."

This work's efforts to do its own computation was partially successful and produced results very compatible with the results by (Aceves, et al., 2013), (Rychlik, 2017) and the FAO.

1. Iodine requirements for nasal mucus are estimated in a publication this month (Kirk-Bayley, et al., 2020) that proposes nasal spray to deactivate covid on inhalation. Their estimate is 330 mcg sprayed into the nasal passages every 6 hours (4 times per day). That equates to total of 1320 mcg per day for the nasal passages. The body will exhale some of

that. When the body has acquired a sufficient store of iodine it can recycle that which is not exhaled.

2. Iodine requirements for sweat are available in another study (MAO, et al.). It measured iodine loss in sweat at 37 mcg/liter of sweat. That is a small adjustment within the uncertainties of the recommended iodine intake of (Aceves, et al., 2013) and. However, it is a substantial amount compared to the RDA of 150 mcg, especially during covid induced fever.
3. Iodine intake requirements for apoptosis could not be found in the literature. Also, iodine used for that function can be fully recycled by the body. Thus, that requirement may be more about available iodine stores than daily intake.

The literature provides several ways to examine the body's iodine storage requirements to support immune functions. (Aceves, et al., 2013) showed that apoptosis rates are limited by iodine levels and that augmenting with 5000mcg/day of I_2 per day for several weeks did significantly increase apoptosis rates. That work did not indicate the baseline iodine intake, but the work occurred in Mexico where the baseline intake is not too different from the 150mcg intake in the United States. This suggests that, for fighting covid, 150 mcg is insufficient and sustained buildup of iodine stores via intake at the FAO upper limit, or a small multiple of it should be sufficient.

Apoptosis rates can also be studied via cancer rates because apoptosis is critical to controlling both viral replication and cancer growth. Cancers are caused by various things; apoptosis is the shared mechanism to beat them down. A summary of that connection is available at (Rychlik, 2017). Very strong correlation between low iodine and cancer is shown in (Kargar, et al., 2017) and similarly in (Rondon, 2019). A further point of reference is that traditional Japanese iodine intake has been 1000 to 3000 mcg and they are among the longest lived as a group in the world and with much lower cancer rates than in the United States. (Zava, et al., 2011)

Digesting all of the above estimates, the conclusions is that it would be very beneficial against covid for people in the United States, and everywhere, to ensure that their iodine intake at least matches United Nations FAO upper limit of 30mcg/kg of weight. Intake at the United States FDA UL of 1100 mcg is not sufficient, but it is better than the RDA of 150mcg.

Nasal Spray or Oral Intake? Both have value. The nasal spray provides a good first line of defense at the nasal passages, however, it does not improve the second line of defense. That is, once infected, it does not improve the ability of the body to kill infected cells to stop viral replication.

Sustained oral intake improves the body's first- and second-line defenses. It may be of value to temporarily raise intake above the FAO safe upper limits for a few weeks to accelerate the build-up of the body's iodine stores.

A small spray bottle of iodine nasal spray may be helpful when among people, especially during the time when your body is first building up iodine stores. It may have extra value for front line medical staff and their covid patients. The same spray also has value for cleaning touch surfaces, and the face in case you accidentally touch it. It is even safe in the eyes. Much of the world uses

it (Kirk-Bayley, et al., 2020) as a better, faster sterilization agent than most alternatives used now in the United States for covid. (Kampfa, et al., 2020).

Suggestion – Raise oral intake to the FAO upper-limit (30 mcg/kg), and keep handy a small spray bottle of diluted iodine. Use the forms of iodine discussed below.

What are good sources of iodine? Sources for oral iodine and topical iodine are different. Sources for both are widely accessible at low cost.

For oral intake – Sources include: bulk potassium iodide, potassium iodide pills, Lugol's iodine solution, kelp, kelp pills, and more. Costs range from 1/10 of cent to about 10 cents per day depending on each individual's chosen source for iodine. Lugol's is on the World Health Organizations list of essential medicines. One drop of Lugol's 2% (not one dropper full) provides 2400 mcg of iodine, the daily intake for a 176 lb. person.

For topical applications – The iodine source of choice, including as a nasal spray, is povidone iodine, a world health organization essential medicine. Typically, povidone iodine solution is sold at 10% concentration. For use, dilute it by at least a factor of 20 and up to a factor of 50. That will create a solution of between .5% and .2% respectively. It is most effective and safest in that range of concentrations. Ready-to-use iodine nasal sprays are now sold, but were out of stock where I searched at the time of this writing.

Why isn't NIH or WHO suggesting this? The reference (Rychlik, 2017) discusses this, especially in the section "History of iodine usage and "iodophobia"".

A simple reason for "iodophobia" became clear when writing this paper. Iodine is sold at such high concentrations that, for effective, safe, convenient use, it should be diluted for use as a pharmacist probably could be doing, but doesn't. Iodine as a medicine predates pharmacists and the ready-to-use economy. In that era, we might have gone to the apothecary who would have done the dilution custom to our individual need. Today, the economy is built for ready-to-use products, but iodine products mostly have not adjusted, so iodine preparation instructions are included below.

Another reason for iodophobia relates to rare side effects that can happen when very high doses above the safe upper limit are taken for a long time, such as when people used it undiluted. Even then effects that are attributed to excess iodine often actually relate an easily fixed imbalance or deficiency of something else, e.g., selenium (Xu, et al., 2010).

The covid pandemic overrides these concerns about iodine, or should. It does for me and it should for all of us. We can fix issues that cause iodophobia later. For now, let's just be sure to dilute the iodine and remember that covid is much more of a problem than any iodine side effect. You can just stop or reduce the iodine if it causes you a problem. We also have the option to stop iodine supplementation when covid is gone.

Why not wait for the nasal spray product or a vaccine? Social distancing is working but only slowly. On April 16, 2020 the New York Governor, Andrew Cuomo reported that social distancing had lowered the transmission rate from above 1. down to .9. At .9, the pandemic will

ease very slowly. He also reported that the Chinese's stricter measures reduced transmission there to .3 which enabled them to crush the pandemic there much faster. To reduce the transmission rate here from .9 to .3 without stricter social distancing measures we need something else. Iodine can do this. Philippines, Thailand and Vietnam are starting to use it specifically as extra protection for medical staff. (Mundipharma, 2020).

The U.S. economy is tanking, covid hot-spots in food processing plants threaten some food supplies. Protests against stay at home orders have begun. Covid tests are still in short supply. Testing of the iodine nasal spray product and the vaccine maybe long-term solutions or they may fail. Oral iodine can be a stop-gap measure or it may become a general pandemic-preventing approach.

How will this Integrate with Plans to Reopen the Economy? Plans for reopening the economy are based on an empirical feedback loop. In that loop, the number of new cases will determine whether and how much to relax or tighten restrictions. Changes to the restriction will then change the number of new cases.

Iodine's impact, whether oral or nasal, will affect the feedback loop via its impact on the number of new cases. If iodine succeeds, then covid transmission will slow, the number of new cases will stay low and the feedback loop will allow more relaxation of the restrictions. The size of this impact will depend on how many people take raised levels of iodine. Each person taking iodine reduces covid transmission. Thus, it becomes valuable to get lots of people using the iodine.

How to detect that iodine is successfully reducing covid transmission and mortality?

Detecting success will leverage future, improved covid testing that should be part of any plan to reopen the economy. Detecting success also depends on whether testers want to know whether iodine, or any other nutritional approach, is helping.

If contact tracing is done as part of reopening the economy, then each tested contact could be asked about their use of iodine (and any other nutritional supplement). The resulting data will allow comparison of infection rate differences for those taking different supplements or other mitigations. Mitigations with the lowest percentage infected will tend to be the best.

What about combining iodine with other mitigations? Some people are taking Vitamin D. Some are taking zinc. Both may help separately or in combination with iodine. There is no known reason to not combine them. As millions of tests are performed, robust data collection and data analysis can make it possible to determine which regimens are best.

Dosing oral iodine. This section addresses only Lugol's Solution 2% as the iodine source to be taken orally. Use the following table to determine the number of drops to take. Find your weight on the left and read across to see the number of drops you need in a week (or month). Given that number of drops you have choices. One approach is to put that number of drops in a sealable bottle. Then fill the bottle with a drink of your choice and close it. Then each day of that week (month) drink a portion of the bottle. Another approach is to take varying numbers of drops each day of the week that add up to the total for the week. For taste and to avoid potential

irritation, dilute in a swig of drink. If concerned about safety use the first approach and start with half as many drops the first week. Repeat weekly (monthly).

weight lbs.	weight kg	Iodine mcg per day	Lugol's 2% drops per day	Iodine mcg per week	Lugol's 2% drops per week	Lugol's 2% drops per month
80	36.4	1091	0.5	7636	3	14
100	45.5	1364	0.6	9545	4	17
120	54.5	1636	0.7	11455	5	20
140	63.6	1909	0.8	13364	6	24
160	72.7	2182	0.9	15273	6	27
180	81.8	2455	1.0	17182	7	31
200	90.9	2727	1.1	19091	8	34
220	100.0	3000	1.3	21000	9	38
240	109.1	3273	1.4	22909	10	41
260	118.2	3545	1.5	24818	10	44
280	127.3	3818	1.6	26727	11	48
300	136.4	4091	1.7	28636	12	51
320	145.5	4364	1.8	30545	13	55
340	154.5	4636	1.9	32455	14	58

Preparing Topical Iodine for Nasal Spray and Other Use. Topical iodine is povidone iodine, different from oral iodine. Don't mix them up. The stomach does not like povidone. That said, iodine nasal sprays are now sold, but out of stock when I checked. Instead you can buy povidone iodine solution 10% and dilute. It is a liquid. An 8 oz. bottle of povidone iodine 10% when diluted will provide over two gallons of spray, so feel free to share. The goal is to dilute by about a factor of 30. Below are two methods to do that. Precision not required.

1. If you have a scale that is accurate to 1/10 of gram or so, directly measure the povidone iodine into convenient spray bottles. Put 1 gram into 1-ounce (30ml) bottles, 2 grams into 2-ounce bottles, etc. Then fill the bottles with distilled water. (Tap water is okay for touch surfaces and hands. Distilled water allows better use for eyes and nose.) Done.
2. If you don't have a good enough scale, use a quart (liter) that can be closed air tight to create dilute solution. Use a measuring spoon (or shot glass) to measure out approximately one ounce (30ml) of the povidone iodine solution and put into the quart (liter). Then fill the quart (liter) with distilled water. Precision not required. Then pour from there into small spray bottles, and close the quart bottle. Done.

The dilute solution should have a dark color, but not stain you. In addition to dilution providing better covid deactivation performance and more liquid to share, dilution avoids: (1) excess absorption of iodine through skin (2) stains, and (3) skin, eye, and nose irritation. All these would never happen if iodine came already dilute, so dilute it and avoid iodophobia.

Conclusion. This is not a proposal to do research or clinical trials. The literature tells us how to use iodine against covid. We just have to do it. We have all changed behaviors several times to

help stop covid. This paper is a suggestion that we each voluntarily make this one more, smaller change that could have large benefit. Let's raise our daily oral iodine to the safe upper limit per the UN FAO (30mcg/kg).

The more people that do this the greater the reduction in covid transmission and mortality. So, let's each enlist many others. Then, when governments relax rules to restart the economy, we won't have a spike in covid transmission and relaxation of the rules can continue.

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