

## TREATMENT OF LONG COVID: MITOCHONDRIAL DYSFUNCTION

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### *Enhancing mitochondrial function after mitochondrial collapse subsequent to covid-19 infection*

The SARS2 coronavirus can invade and infect the body's mitochondria. The viruses can use this as a protected niche to escape the immune system. At its most severe, it can shut down mitochondrial function system wide which results in the blood oxygen content *returning* to the heart being nearly as high at the blood *leaving* the lungs.

This protocol is to help reverse that; it may also be of use for people who have mitochondrial dysfunction of a lesser degree that has occurred from other factors.

Note: this protocol is liquid only because the person who originally contacted me about it has gastroparesis which affects the stomach.

The protocol is oriented around the use of melatonin and herbs/supplements to protect mitochondria, enhance their function, and stimulate mitochondrial biogenesis, that is, the formation of new mitochondria.

I am not appending many citations for this material, still too fatigued to do that sort of thing, but for those who are interested, you can find a large number of them at google scholar if you just type in the relevant terms. I will just append one or two for each action I note. (For some reason, wordperfect, the program I use, does not like highlighted links, I don't know why. It won't even let me input them. Irritating. If you want to access the citations, you will need to copy

and paste into a search engine, sorry.)

**Melatonin:**

Melatonin has a number of functions that are just starting to be understood by the reductive medical system. That it helps sleep is well known (and enhancing sleep during episodes of severe fatigue is *extremely* important). What is far less understood is that melatonin is a fairly potent antimicrobial for both bacteria and viruses. It is particularly effective for pathogens that affect the lungs and, importantly, unlike other substances, it is *more* effective for Gram-negative than Gram-positive organisms. (Please note that the use of what I recommend here can cause microbial die-off; you may feel very flu-like the next day . . . it seems as if this only occurs after the first use. It will pass, just do it where you don't need to go to work the next day.)

*Antimicrobial effects:*

[https://d1wqtxts1xzle7.cloudfront.net/67303247/j.1600-079x.2007.00516.x20210512-30379-1405uch.pdf?1620819340=&response-content-disposition=inline%3B+filename%3DMelatonin\\_as\\_an\\_antibiotic\\_new\\_insights.pdf&Expires=1634422680&Signature=WVxqbHsQdlyCpPL6bVre68Nq-pfp90Murl6o48q6t-p1p~d3CvUIZtXFj0dGIqSKLorPgy4iOTFKxXSQPgGSIvZ0Y6Ne39XgNlaej1C7HGTnWOj5uDYZAmYde8lwQXF2Szx-KdtmEcSKWENnfjmYKJ-W~15FHfJxq5ApsSswSxrPP39HRiyB8FQJwaInifgOOZwOHJaRCf0ihpF-lREQJfIk4yOR-WLVB6QTTKxBUs5Og6ow7liDentzkDqxYAuLPaTY-ST3FjwxwwUEZf5W4VSOLfjmKpGpTtOdCMubeMJRDYLQtRrr1zCSCo4oSFGwQN0igFZlwK5w7fGa9Rg\\_\\_&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA](https://d1wqtxts1xzle7.cloudfront.net/67303247/j.1600-079x.2007.00516.x20210512-30379-1405uch.pdf?1620819340=&response-content-disposition=inline%3B+filename%3DMelatonin_as_an_antibiotic_new_insights.pdf&Expires=1634422680&Signature=WVxqbHsQdlyCpPL6bVre68Nq-pfp90Murl6o48q6t-p1p~d3CvUIZtXFj0dGIqSKLorPgy4iOTFKxXSQPgGSIvZ0Y6Ne39XgNlaej1C7HGTnWOj5uDYZAmYde8lwQXF2Szx-KdtmEcSKWENnfjmYKJ-W~15FHfJxq5ApsSswSxrPP39HRiyB8FQJwaInifgOOZwOHJaRCf0ihpF-lREQJfIk4yOR-WLVB6QTTKxBUs5Og6ow7liDentzkDqxYAuLPaTY-ST3FjwxwwUEZf5W4VSOLfjmKpGpTtOdCMubeMJRDYLQtRrr1zCSCo4oSFGwQN0igFZlwK5w7fGa9Rg__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA)

*Mitochondria depend on glutathione (GSH) from the cytoplasm to function well. Melatonin increases GSH levels in the cells:*

<https://onlinelibrary.wiley.com/doi/pdfdirect/10.1034/j.1600-079X.2001.300201.x>

*It is protective of the mitochondria:*

<https://pubmed.ncbi.nlm.nih.gov/12204540/> (Why this one links, only computer gods know.)

*It is anti-inflammatory:*

<https://www.hindawi.com/journals/ije/2017/1835195/> (Sigh)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3001216/?fbclid=IwAR3smShfPxCMWx0TpJ5hv3FueDko1YxMXYQgty7zebBsUSNGcwUfPerAJ08>

*Its pharmacokinetics are good:*

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3682489/pdf/nihms343886.pdf>

### **The Type of Melatonin to Use: Inhaled**

Inhaled melatonin directly affects the lungs, which is very good for post Covid infection as well as any chronic inflammatory lung disease. (This type does not contain substances known to negatively affect the lungs.) Because it does not go through the GI tract it is more potent and more immediate. In this particular instance it goes directly into the blood, thus getting to all the cells in the body. It will also help sleep.

Dosage and Time: Take as soon as you are in bed. The dosage recommendations for this product is 5-10 puffs on the vaporizer, holding each for 30 seconds. I found that 3 was sufficient. I would recommend working up to the dose you are comfortable with. It lasts one to two months before needing replacement.

<https://www.inhalehealth.com/products/melatonin-inhale-lavender-dream>

### **Salvia miltiorrhiza, Pueraria:**

These herbs are already part of the Covid protocol, but they have particular relevance for treating

mitochondrial dysfunction.

Stimulating ACE2 overexpression upregulates and restores mitochondrial function, induces production of ATP, down regulates mitochondrial-localized inflammation.

There are citations for this at google scholar and as well in the bibliography of the updated herbal antivirals book which covers covid.

salvia and pueraria upregulate and enhance ace2 expression, increase its activity, and lower ang-2 (which also increases ace2).

**Tincture of salvia: 1 tsp 3x daily; tincture of pueraria (kudzu): ½ tsp 3x daily**

**Craetagus:**

Ace inhibitors increase ace-2 expression, protect lungs and heart, craetagus is a specific ACE inhibitor and as well acts as a tonic for the heart. **Tincture: ½ tsp 3x daily**

**note: all tinctures can be combined in liquid of choice**

**Resveratrol:**

Resveratrol enhances mitochondrial function, mitochondrial biogenesis, protects against metabolic decline.

<https://journals.physiology.org/doi/full/10.1152/ajpheart.00368.2009>

<https://www.sciencedirect.com/science/article/pii/S0092867406014280>

<https://link.springer.com/article/10.1007/s12035-017-0448-z> (Continually irritating)

I recommend this product (but I am sure tinctures will do fine)

*premier research labs, premier resveratrol liquid*

**Dose: 1 tbl 3x daily or you can use a tincture if you wish**

**Lycium barbarum and L. Chinense (Goji Juice):**

These enhance mitochondrial function through both their melatonin content and melatonin upregulation as well as upregulating the amount of pyruvate dehydrogenase, enhancing mitochondrial function and lowering fatigue in the body. Protects and enhances mitochondrial function.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5555107/> (Sigh)

<https://www.sciencedirect.com/science/article/pii/S0753332219307152>

<https://www.sciencedirect.com/science/article/abs/pii/S0926669021003113>

Recommended: Dynamic health, certified organic Goji gold, 32, fl oz

**Dose: 2 tbl, 3x daily**

### **L-tryptophan:**

oral L-tryptophan (150-300 mg/kg) enhances mitochondrial function. It also helps with sleep; the threonate in the brand recommended can often help brain fog (it's pretty good at it for some people). Note: this is the weakest of the suggestions in its effects on mitochondria. I still think it worth using initially. (I am giving up on the citations . . . stephen stamps his little feet)

Brand recommended: H.F.T. hybrid sleep supplement

This contains liquid tryptophan, plus magnesium threonate

**Dosage: before bed, one ounce**

Note: L-threonate makes me wakeful, not sleepy (other people sleep very well on it). If this happens, use it in the day, one ounce 2x daily