

Zinc and COVID-19: What malaria drugs can teach us

By Kelly Dorfman, MS, LND

Medical Disclaimer: *The information in this article is for general information purposes only and does not constitute medical advice. Contact your health care provider about any questions concerning your health.*

Without a federal pandemic response team to consolidate data and coordinate a response, the coronavirus situation is looking a few bacteria short of a decent kombucha. Despite herculean efforts by devoted medical professionals who are almost to the point of sharing hospital gowns, you cannot depend on available or effective treatment. The best plan is to optimize your own immune response and avoid the need for emergency intervention.

Luckily, the South Koreans have a Cracker Jack pandemic response team and they developed a treatment plan that kept their mortality levels at a fraction of what other countries are experiencing. If you get sick, you cannot write your own prescriptions based on their protocol, but you may be able to use what they discovered to prevent the need for more intensive interventions.

The Birds and the Bees: Virus Version

Recall that viruses are pieces of genetic material that cannot reproduce themselves. They need an organism with cells capable of replicating genetic material. COVID-19 is an RNA virus twisted under a protective fatty layer. On its surface is a protein so small it is just called the letter S. If they can find a friendly receptor, S proteins can attach a virus to a cell wall and dump in its genetic material for a little viral hanky-panky. Cell walls are loaded with different kinds of receptors because substances are constantly passing in and out. The receptors are molecularly specific, like a lock is to a key to keep out trouble.

S protein fits into receptors of lung cells. They dock, just like the Starship Enterprise. In goes the RNA strand ready to replicate. All RNA, including destructive viral RNA is made from the same 4 nucleotide building blocks. RNA is a string of coded instructions for how to reproduce and make proteins the cell needs to function. The RNA readers (ribosomes) will copy any instructions if they contain some combination of the 4 nucleotides and a boss enzyme gives the command. A human enzyme would never tell the ribosomes to copy foreign RNA, so the viruses provide their own enzyme. This enzyme is called RNA-dependent RNA polymerase (RdRP) or replicase, for short. RdRP tells the cell to copy the virus RNA and make it snappy.

Viruses reproduce quickly and take over as many cells as fast as they can. All too soon the immune system will notice the foreigner in the dock on the cell surface and start the ejection process. The more RdRP, the faster and more aggressive the invasion.

RdRP Meet Zinc

You have heard zinc is good for your immune system, but did you know it is ultimate RdRP kryptonite? Zinc blocks RdRP and slows down virus reproduction. In theory, zinc could control COVID-19 but it must get into the cell. Zinc needs the biological equivalent of a UPS truck to transport it through the cell's protective membrane. This facilitator molecule is called an ionophore. Ionophore means ion carrier. Zinc is an ion or a molecule with an electrical charge. The ionophore binds to zinc, carries it from the blood through the fatty bilayer of the cell wall and drops it off inside.

The old malaria drugs, chloroquine and hydroxychloroquine are zinc ionophores. They transport zinc into the cell to shut down RdRP in malaria but doctors in South Korea and China report they also help patients with COVID-19, though there are no clinical studies. The protocols (which reportedly sometimes include added zinc) have not undergone the rigor we all love but who has had the time?

One old study found that a small amount of chloroquine was more effective at increasing intracellular zinc than taking large amounts of zinc. Chloroquine is an old, cheap prescription medicine with an arm's length of side effects. (Hydroxychloroquine is similar but with fewer side effects.) Good to know how it might help. Better not to need it.