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Vitamin C, B1 and Hydrocortisone Dramatically Reduce Mortality From Sepsis

Analysis by Dr. Joseph Mercola | December 20, 2023

STORY AT-A-GLANCE

- Sepsis is caused by an aggressive, out-of-control immune response to an infection in the bloodstream. Each year, an estimated 1 million Americans get sepsis and up to half of them die
- Giving patients IV vitamin C with hydrocortisone and thiamine (vitamin B1) for two days reduced mortality nearly five-fold, from 40% to 8.5%
- Lab testing shows that while neither vitamin C or hydrocortisone alone can prevent cell death following exposure to toxins produced by bacteria, when given in combination, the concoction does protect the cells

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Sepsis[1] is a progressive disease process caused by an aggressive, dysfunctional immune response to an infection in the bloodstream. It starts with symptoms of infection that can progress to septic shock.

Unless treated — and the earlier the better — sepsis can result in extremely low blood pressure that is unresponsive to fluid replacement, weakening of the heart, and multiple-organ failure. Sepsis is a common hospital-acquired infection,[2,3] but common illnesses such as bronchitis, pneumonia, strep throat or kidney infection can also turn septic, as can localized infections caused by bacteria, fungi or viruses.

The condition becomes particularly problematic and deadly if the infection involves methicillin-resistant or vancomycin-resistant Staphylococcus aureus (MRSA or VRSA) bacteria. Each year, an estimated 1 million Americans get sepsis[4] and up to half of them die.[5,6] Treatment can be a challenge, and is becoming even more so as drug-resistant infections become more prevalent.

According to the Agency for Healthcare Research and Quality, sepsis is the most expensive condition being treated in U.S. hospitals, costing more than $20 billion in 2011[7] and $24 billion in 2014.[8] The good news is a critical care physician just may have found a way to save tens of thousands of lives and billions of dollars each year using two readily available vitamins and a steroid.

Vitamin C and Thiamine — An Inexpensive Cure for Sepsis

Vitamin C is well-known for its ability to prevent and treat infectious diseases. Previous research has shown it effectively lowers pro-inflammatory cytokines and C-reactive protein.[9,10] Influenza,[11] encephalitis and measles[12] have all been successfully treated with high-dose vitamin C.

Studies have even shown vitamin C is selectively cytotoxic to cancer cells by generating hydrogen peroxide when administered intravenously (IV) in high doses. It also has a number of heart and cardiovascular benefits.

The anti-infective power of vitamin C has now been demonstrated yet again by Dr. Paul Marik, a critical care doctor at Sentara Norfolk General Hospital in East Virginia. Last January, when faced with yet another deathly ill patient, Marik decided to try a combination of intravenous (IV) vitamin C with hydrocortisone as a last-ditch effort to save the woman's life.[13]

He'd recently read a colleague's paper on vitamin C, and he knew vitamin C acts like the steroid hydrocortisone, so on a hunch, he administered the two together. It worked. While everyone expected her to die, the woman made a remarkable overnight recovery. As reported by NBC4i News:[14]

> *"The staff couldn't believe it, so they tried it again and again — with the same results. They added a third element, thiamine, to the IV treatment as well. Today, they have used the treatment on about 150 patients and they say the result is the same …*
>
> *A researcher at Old Dominion University, John Catravas, Ph.D., … did an independent lab study that confirms the treatment's effectiveness."*

Interestingly, Marik used a relatively small amount of vitamin C — only 1.5 grams IV. Most natural medicine physicians tend to use 25 grams or more when giving IV vitamin C, more than 20 times the dose used here. One can only wonder how much more effective a larger dose would be.

It's All About the Right Combination of Ingredients

For the first two or three patients, only vitamin C and hydrocortisone were used. Marik then decided to add thiamine for a number of reasons. Importantly, it's required for metabolism of some of the metabolites of vitamin C.

Research has also shown many patients with sepsis are vitamin deficient, and when thiamine is given, it reduces mortality. Septic shock patients who receive thiamine have also been shown to have a reduced risk of renal failure.

Marik's retrospective before-after clinical study,[15,16] published in the journal Chest, showed that giving patients IV vitamin C with hydrocortisone and thiamine (vitamin B1) for two days reduced mortality nearly five-fold, from 40% to 8.5%.

Of the 50 patients treated, only four died — and none of them actually died from sepsis. They died from their underlying disease.

Interestingly, further lab testing found that while neither vitamin C nor hydrocortisone alone are able to prevent cell death following exposure to toxins produced by bacteria, when given in combination, the concoction does protect the cells. Turns out Marik's hunch had been a truly inspired one.

Other research has also shown thiamine reduces mortality from sepsis and helps protect against renal failure, which is why Marik decided to add it to his mixture.

The treatment has now become part of the hospital's standard of care for sepsis, and will hopefully become standard of care for sepsis elsewhere as well. As noted by Marik, sepsis kills about 1,000 people each day in the U.S. — that's like having three jumbo jets crash each day.

Sepsis kills more than breast cancer, colon cancer and AIDS combined, and here's a treatment that is not only profoundly effective, but also has no side effects and is inexpensive, readily available and simple to administer. Patients and doctors really have nothing to lose by trying it.

Potential Contraindication

While more research is needed to validate the findings, vitamin C and thiamine (vitamin B1) administration is so safe there's really no need to avoid it. It certainly isn't going to make the situation worse — unless you happen to be glucose-6-phosphate dehydrogenase (G6PD) deficient (a genetic disorder).[17]

G6PD is an enzyme your red blood cells need to maintain membrane integrity. High-dose IV vitamin C is a strong pro-oxidant, and giving a pro-oxidant to a G6PD-deficient individual can cause their red blood cells to rupture, which could have disastrous consequences.

Fortunately, G6PC deficiency is relatively uncommon, and can be tested for. People of Mediterranean and African descent are at greater risk of being G6PC deficient. Worldwide, G6PD deficiency is thought to affect 400 million individuals, and in the U.S., an estimated 1 in 10 African American males have it.[18]

Anecdotal Evidence Suggests Near-Infrared Light May Protect Against Kidney Failure

On a side note, your risk of kidney failure — which is a very common outcome of sepsis — may be reduced or prevented by shining a near-infrared light on the area. I know, that sounds too amazing to be true, but according to Michael Hamblin, Ph.D., a photodynamic therapy researcher, the anecdotal evidence for this is quite strong.

> *"Kidney failure is the third leading cause of death. These are old folks who are dying from kidney failure. You can't really give them transplants because they're elderly. You put a near-infrared LED array where their kidneys are and it seems to work like a dream. [But] it's hardly been studied at all,"* Hamblin said.

Again, the worst that could happen is nothing, as red and near-infrared light (630 to 830 nanometer range) is quite safe.

Other Health Benefits of Thiamine

Thiamine or vitamin B1,[19] found in pork, dark leafy greens, wheat germ, green peas, lentils and nuts,[20] is perhaps best known for its role in cellular production of energy and supporting normal neuronal activity. However, it also has a wide range of other health benefits.[21] According to the Mayo Clinic, studies confirm thiamine can be helpful for a long list of diseases and disorders, including:[22]

- Metabolic and mitochondrial disorders[23]
- Blood clots and clogged arteries[24]
- Cerebellar ataxia (movement disorder caused by neurological damage)[25]
- Coma[26]
- Kidney dysfunction[27]

Research[28] published in 2013 also found thiamine supplementation can improve cardiac function in those with heart failure. Overall, patients with heart failure tend to be deficient in thiamine, as well as other micronutrients. Thiamine deficiency has also been linked to delirium,[29] thyroid fatigue and Hashimoto's (a thyroid autoimmune disorder).[30]

These and other health effects may help explain why thiamine works so well (in conjunction with vitamin C and hydrocortisone) for sepsis.

For general health purposes, adult men and women need about 1.2 and 1.1 milligrams (mg) of thiamine respectively each day. Also be aware that thiamine conversion is dependent on having sufficient amounts of sulfur. Good sources of dietary sulfur include organic pastured eggs, legumes, garlic, onion, **Brussel sprouts**, asparagus, **kale** and wheat germ.

Moreover, all B vitamins, including thiamine, are produced within your gut[31] provided you have a healthy gut microbiome. So, eating real food, ideally organic, along with fermented foods will provide your microbiome with important fiber and beneficial bacteria to help optimize your internal vitamin B production.

To Avoid Sepsis, Understand the Cause

With sepsis affecting more than a million Americans each year, how can you avoid becoming a statistic? First, be aware that ANY infection can lead to sepsis. While it's typically associated with hospital-acquired infections, nearly half of all cases are in fact the result of an infection acquired outside a hospital setting.[32]

Part of what makes it so deadly is that people typically do not suspect it, and the longer you wait to treat it, the deadlier it gets. As noted in a special report on sepsis by Consumer Reports:[33]

> *"Whenever the body develops an infection, the immune system normally kicks in, producing chemicals to fight the infection. But sometimes — either because the triggering bacteria is unusually powerful or because the person's immune system is already weakened by other health problems — those chemicals are set loose in the bloodstream and course through the body.*
>
> *Instead of just fighting the local infection, those chemicals unleashed by the immune system cause widespread inflammation and damage tissues in the liver, kidneys, heart and other organs.*

Within hours, blood clots can begin to form, and damage to blood vessels causes blood pressure to drop, which in turn slows the delivery of vital nutrients to those organs already under attack. In the final stages, the heart weakens and organs begin to fail."

According to the Centers for Disease Control and Prevention, you're at higher risk for sepsis if you have:

- **Chronic disease —** A vast majority — 7 out of 10 — of people who develop sepsis have some kind of chronic health condition. Those with diabetes, lung, kidney or liver disease tend to be particularly susceptible to infection, which raises the risk.
- **Weakened immune system,** AIDS or cancer.
- **Recently spent time in a hospital, nursing home or other health care facility,** as exposure to infection-causing bacteria is common in these places.

Common Sense Strategies to Reduce Your Risk of Sepsis

While health care workers have a responsibility to prevent infections that could potentially turn septic and to educate patients about warning signs of sepsis, you can lower your own risk by:

- **Promptly treating urinary tract infections (UTIs) —** UTIs are the second most common type of infection in the body, sending more than 8 million people to their health care providers every year in the U.S. alone,[34] and one-quarter of sepsis cases are related to urinary tract infections.

  Conventional treatment typically involves antibiotics, but research shows 90% of UTIs can be successfully treated with D-Mannose, a naturally occurring sugar that's closely related to glucose.

- **Properly clean skin wounds —** About 1 in 10 sepsis cases are due to skin infections, so always take the time to properly clean and care for wounds and scrapes. Wash the wound with mild soap and water to clean out dirt and debris, then cover with a

sterile bandage. Diabetics should follow good foot care to avoid dangerous foot infections.

- **Avoid infections in hospitals —** When visiting a health care facility, be sure to wash your own hands, and remind doctors and nurses to wash theirs (and/or change gloves) before touching you or any equipment being used on you.

  If you have to undergo a colonoscopy or other testing using a flexible medical scope, remember to call and ask how they clean their scopes and what kind of cleaning solution they use. If the answer is glutaraldehyde (brand name Cidex), find another hospital or clinic — one that uses peracetic acid. This preliminary legwork will significantly decrease your risk of contracting an infection from a contaminated scope.

  In the video below, Andrew Saul, Ph.D., co-author of the book, "Hospitals and Health: Your Orthomolecular Guide to a Shorter, Safer Hospital Stay," discusses the dangers of hospital stays, the type of patient that tends to get killed the most, and how you can protect your health and life in the event you have to spend time in a hospital.

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