

Unlocking the Power of Methylene Blue

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STORY AT-A-GLANCE

- › Methylene blue enhances cellular energy production by integrating into the electron transport chain, cycling between oxidized and reduced forms to improve mitochondrial efficiency and resolve metabolic issues
- › Clinical trials show methylene blue's role in treating neurological conditions, including slowing progression of Alzheimer's at doses of 16 mg daily
- › Studies indicate methylene blue's effectiveness in treating septic shock, reducing mortality rates, shortening hospital stays and improving blood pressure without significant adverse effects
- › Research reveals methylene blue's anticancer properties, particularly in chemoresistant ovarian tumors, by selectively targeting cancer cell mitochondria while sparing healthy cells from damage
- › Safe dosage ranges from 5 mg to 50 mg daily, but requires medical supervision due to potential interactions with SSRIs and risks for those with kidney issues or G6PD deficiency

Few substances have captured my attention as profoundly as methylene blue. Earlier this year, I engaged in an in-depth discussion with Georgi Dinkov, a respected expert in metabolic health, who shed light on the multifaceted benefits of this remarkable compound.¹

Methylene blue, a quinone-like molecule, is not just another supplement; it's a powerful agent that can play an important role in cellular metabolism. By accepting and donating electrons, methylene blue enhances mitochondrial function, addressing issues like reductive stress that are often overlooked in conventional medicine.

This conversation with Dinkov highlights methylene blue's role in reaching optimal health and treating a myriad of conditions, ranging from mental health disorders to acute medical emergencies.

Methylene Blue and the Electron Transport Chain

Methylene blue has the ability to integrate seamlessly into the electron transport chain (ETC), which plays a role in cellular energy generation. Unlike traditional antioxidants that either donate or accept electrons and subsequently require excretion, methylene blue possesses the unique capability to cycle between its oxidized and reduced forms indefinitely.

This continuous electron transfer process ensures sustained improvement in mitochondrial efficiency, which is key for energy production and overall cellular health. Dinkov emphasized that methylene blue acts as an emergency oxidant, stepping in to accept electrons even when essential **co-actors like NAD+** are deficient.

This makes methylene blue capable of resolving metabolic issues associated with electron buildup and **reductive stress**. By maintaining the flow of electrons within the ETC, methylene blue prevents the stagnation that leads to cellular dysfunction and various health problems.

Methylene Blue for Enhanced Brain Health

The therapeutic potential of methylene blue is vast and varied, extending across a spectrum of **neurological and psychological conditions**. Dinkov shared insights into several studies where methylene blue, even at relatively low doses of 15 to 50

milligrams (mg), demonstrated significant benefits in treating treatment-resistant depression and psychosis.²

These findings are groundbreaking, suggesting that methylene blue enhances cognitive function and stabilizes mood by improving mitochondrial performance and reducing oxidative stress in the brain. Methylene blue enhances the benefits of niacinamide (vitamin B3) on brain health and metabolism.³ Furthermore, in terms of neurodegenerative diseases, methylene blue has shown remarkable promise.

A modified version of methylene blue, developed by a UK-based company, has been patented for Alzheimer's treatment. Clinical trials have reported an astounding 80% reversal of Alzheimer's symptoms in participants, according to Dinkov, highlighting methylene blue's ability to not only halt but also reverse cognitive decline.⁴

These applications underscore the compound's role in enhancing brain health by ensuring efficient energy production and mitigating the damaging effects of oxidative stress. A stabilized form of methylene blue known as hydromethylthionine (LMTM) also shows promise in treating mild to moderate Alzheimer's disease.⁵

Unlike traditional methylene blue, LMTM is a stabilized dihydromesylate salt, which offers improved pharmacokinetic properties, including better brain uptake and longer half-life in humans. The study involved 1,162 patients across two Phase III trials and revealed a concentration-dependent activity of LMTM on cognitive decline and brain atrophy.

Notably, the optimal therapeutic dose was identified around 16 mg a day, which maximizes cognitive benefits without the diminishing returns observed at higher doses of 150 to 250 mg per day. This plateau effect underscores that beyond a certain concentration, no additional benefits are observed, aligning with the study's findings that higher doses do not confer extra advantages.

Moreover, LMTM demonstrated significant benefits both alone and as an add-on to existing Alzheimer's treatments. Patients receiving LMTM showed reduced cognitive decline and slower brain atrophy compared to those with lower plasma levels. This

suggests that even at lower, more manageable doses, LMTM effectively slows the progression of Alzheimer's by enhancing mitochondrial function.

Methylene Blue's Life-Saving Benefits in Septic Shock

Expanding methylene blue's therapeutic applications, a systematic review and meta-analysis published in *Critical Care Explorations* evaluated the efficacy and safety of methylene blue in patients with septic shock,⁶ a condition with high mortality rates.

The analysis included six randomized controlled trials encompassing 302 patients and sought to determine whether methylene blue administration could improve outcomes compared to placebo or usual care.

The findings suggest that methylene blue may significantly reduce short-term mortality, shorten the duration of vasopressor use by approximately 31 hours and decrease hospital length of stay by about two days.

Additionally, methylene blue was associated with an increase in mean arterial pressure at six hours post-administration. Importantly, the study did not find an increase in adverse events.

Methylene blue functions by inhibiting endothelial and inducible nitric oxide synthase, thereby counteracting the profound vasodilation characteristic of septic shock. By restoring vascular tone, methylene blue helps maintain adequate organ perfusion and oxygenation, which are necessary for patient survival.

Methylene Blue for Cancer Treatment – Targeting Ovarian Tumors

Research is also exploring methylene blue as a treatment for ovarian cancer, particularly in cases resistant to conventional chemotherapies. A study published in *Cancers (Basel)* used a carboplatin-resistant ovarian cancer tumor model in mice to assess the impact of methylene blue on tumor growth.⁷

The findings revealed a significant in vivo reduction in tumor proliferation among mice treated with methylene blue compared to those receiving carboplatin alone or no treatment. Specifically, methylene blue demonstrated superior tumor suppression, highlighting its effectiveness against chemoresistant ovarian tumors.

Further in vitro analyses provided insights into the mechanisms underlying methylene blue's anticancer effects. The study examined the impact of methylene blue on mitochondrial energetics in both cancerous and normal cell lines. Methylene blue altered the oxygen consumption rate and mitochondrial membrane potential in the ovarian cancer cells, suggesting enhanced mitochondrial respiration and induction of apoptosis.

In contrast, normal cells exhibited a markedly different response, with less pronounced changes in mitochondrial function, indicating a selective targeting of cancer cell mitochondria by methylene blue.

The combination of methylene blue with a mixture of lipoic acid and hydroxycitrate and carboplatin was investigated to evaluate synergistic effects. While the combination therapy showed a modest enhancement in tumor response compared to methylene blue alone, the difference was not statistically significant. Importantly, the metabolic therapies did not induce toxicity or weight loss in the treated mice, underscoring the favorable safety profile of methylene blue-based treatments.

By targeting the altered mitochondrial function and inducing apoptosis in chemoresistant cancer cells, methylene blue offers a novel approach that could improve treatment outcomes for patients facing limited options. The differential response between cancerous and normal cells also suggests that methylene blue selectively targets tumor metabolism, minimizing harm to healthy tissues.

Methylene Blue in Emergency Situations, Including Heart Attack

Beyond its chronic health benefits, methylene blue proves invaluable in acute medical emergencies. Dinkov elaborated on its effectiveness in treating conditions such as

cyanide and carbon monoxide poisoning. In these scenarios, methylene blue acts swiftly to restore cellular respiration by accepting electrons and facilitating the utilization of oxygen, thereby reversing the toxic effects of these poisons.

I also recommend having methylene blue readily available at home in case of a heart attack. While sudden death is the most common symptom of heart disease, surviving individuals face the serious threat of reperfusion injury, where cellular dysfunction and death may worsen following the restoration of blood flow.

Methylene blue administration significantly mitigates tissue damage; however, proper dosage is important to avoid overdose. Administer methylene blue within minutes of the cardiac event to meet the critical time threshold.

In cases of stroke or heart attack, even a single dose below 50 mg may be life-saving. This rapid benefit makes methylene blue an essential tool in emergency medicine, offering a quick and efficient means to counteract metabolic crises.

I strongly advocate for the inclusion of methylene blue in emergency kits, as its ability to stabilize metabolic function swiftly provides an additional layer of protection against sudden, life-threatening metabolic disturbances. The potential of methylene blue to act as a universal antidote in various poisoning scenarios underscores its significance in both medical and emergency settings.

Methylene Blue and Antiaging Benefits

The antiaging properties of methylene blue is another exciting frontier that Dinkov passionately discussed.⁸ Studies have indicated that methylene blue reverses aging in human cells by maintaining optimal mitochondrial function and reducing oxidative damage, which are key factors in the aging process. Daily doses ranging from 5 mg to 50 mg help achieve the necessary concentration for these benefits without causing discoloration in urine or tissues.

Moreover, when combined with red light therapy, methylene blue's effects are significantly amplified. This synergy promotes cellular rejuvenation and longevity by

enhancing mitochondrial efficiency and reducing oxidative stress, thereby combating the visible signs of aging and supporting overall cellular health.

Dinkov mentioned an innovative approach where methylene blue is used in a dilution similar to mouthwash as an oral rinse, offering antiseptic benefits without the harsh side effects of conventional mouthwashes.⁹ This application not only leverages methylene blue's metabolic benefits but also integrates it into daily routines for enhanced health and longevity.

Beyond the primary benefits discussed, methylene blue exhibits several other promising properties that could significantly enhance various aspects of health and medicine. Dinkov mentioned that methylene blue acts as a powerful aromatase inhibitor at sub-micromolar concentrations, which could have implications in managing hormone-related conditions.¹⁰

Additionally, methylene blue's ability to enhance the flow of electrons within the electron transport chain makes it a versatile supplement for addressing a wide range of metabolic disturbances. Dinkov also introduced the concept of the "Methylene Blue Test of Health," where the dosage at which an individual's urine begins to turn blue serves as an indicator of their metabolic health.¹¹

A lower dosage threshold for this coloration suggests better metabolic function, while higher thresholds may indicate underlying health issues such as cancer or diabetes, which are characterized by extreme reduction states in cells.

This innovative approach provides a simple yet effective method for individuals to monitor their metabolic health and take proactive measures to address any issues. As research continues to unfold, the full spectrum of methylene blue's benefits will likely expand, positioning it as a cornerstone in both preventative and therapeutic health strategies.

Safety and Dosage Considerations

While the benefits of methylene blue are substantial, Dinkov highlighted the importance of appropriate dosing to avoid severe adverse effects that may occur with high doses, particularly serotonin syndrome – a fatal condition caused by excessive serotonin levels in the brain.

Methylene blue is a potent monoamine oxidase type A (MAO-A) inhibitor, which may dangerously elevate serotonin levels when combined with [selective serotonin reuptake inhibitors \(SSRIs\)](#) or other serotonergic drugs. I would advise strong caution for anyone ever to take an SSRI drug, as I don't believe anyone benefits from them.

Further, at doses exceeding 30 mg to 50 mg, methylene blue may cause temporary blue discoloration of urine and, occasionally, the tongue. Although harmless, this effect is startling if unexpected. High doses may also interfere with pulse oximeter readings, leading to inaccurate assessments of blood oxygen levels.

Individuals with severe renal insufficiency should use methylene blue with caution and under close medical supervision, as impaired kidney function affects drug clearance. Additionally, methylene blue is contraindicated for patients with glucose-6-phosphate dehydrogenase (G6PD) deficiency due to the risk of hemolytic anemia.

Common side effects associated with methylene blue include mild and transient gastrointestinal discomfort, such as nausea and diarrhea. Allergic reactions, ranging from skin rashes to life-threatening anaphylaxis, are also possible. Neurological effects like headaches and confusion may occur.

Cardiovascular effects, though less common, may include increased blood pressure and palpitations. Furthermore, methylene blue interacts with various medications, particularly antidepressants and antimalarials, altering their efficacy or causing adverse reactions.

To mitigate these risks, Dinkov recommends lower daily doses of methylene blue, typically between 5 mg to 15 mg, especially for long-term use. These dosages are sufficient to harness its metabolic benefits without significantly increasing the risk of serotonin syndrome. Additionally, Dinkov pointed out that while higher doses (up to 50

mg) have shown efficacy in certain therapeutic applications, they must be approached with caution and under professional supervision.

If you're considering methylene blue supplementation, consult with a knowledgeable health care professional to tailor the dosage to your specific needs and avoid harmful interactions with other medications.

My Recommendations for Methylene Blue Use

There are three types of methylene blue typically sold – industrial-grade, chemical-grade (laboratory-grade) and pharmaceutical-grade. The only one you should use is the pharmaceutical-grade variety in solid, capsule or tablet form. Avoid using any solutions of methylene blue as dissolving it in water leads to a significant decrease in its effectiveness after 48 to 72 hours.

Methylene blue is a popular choice in aquarium maintenance due to its antifungal, antiparasitic and oxygen-transporting capabilities. It's commonly used to alleviate fish stress, combat fungal infections and eliminate external parasites like Ich (white spot disease). However, aquarium-grade methylene blue often contains harmful contaminants, including heavy metals, which pose serious health risks to your aquatic pets.

To ensure the safety and well-being of your pets, I strongly advise against using methylene blue products designed for aquariums in any pet-related applications. Instead, choose pharmaceutical-grade methylene blue, which undergoes rigorous testing to confirm it is free from harmful impurities.

Personally, I have eliminated my regular intake of methylene blue, finding that daily walks by the ocean are an excellent way to manage reductive stress naturally. However, in scenarios where I might not have access to the ocean, I would consider taking 5 mg of methylene blue daily, adjusting to 3 mg if I were 75 pounds lighter in weight, and doing so six days a week.

It's essential to emphasize that the appropriate and legal way to use methylene blue is through a prescription from a qualified physician. If you're contemplating the use of methylene blue for your health, I strongly encourage you to consult with your doctor to determine if it's suitable for your specific needs and circumstances.

Sources and References

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