



THE STATE OF NITRIC OXIDE

REPORT



2024

NOVEMBER



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Berkeley Life

THE STATE OF NITRIC OXIDE REPORT 2024



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I have been interested in the role that Nitric Oxide plays in health and disease since 1998 when I had the pleasure of meeting Louis Ignarro and Ferid Murad, two of the three Nobel Prize winners for their discovery of Nitric Oxide.

I have been very supportive over the past twenty-five years of research and development work that helps to improve the multiple physiological functions associated with Nitric Oxide.

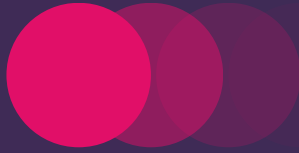
-Dr. Jeffrey Bland

Introduction

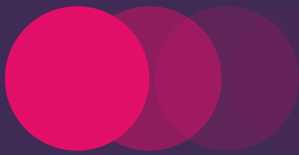
The State of Nitric Oxide Report provides an in-depth overview of recent advancements in Nitric Oxide research and its importance in healthcare and wellness for 2024. It highlights Berkeley Life's commitment to research, efficacy, and optimal well-being, powered by Nitric Oxide. The report includes data-driven insights, testimonies, and expert commentary to educate and promote ongoing discussions about Nitric Oxide in healthcare.

Wellness Begins with Better Blood Flow

Better blood flow requires Nitric Oxide and is critical in addressing:



Blood pressure management



Hormone regulation



Sexual health concerns



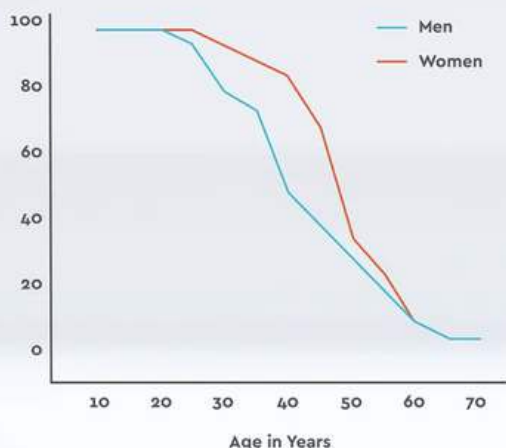
Fatigue and low energy



Nitric Oxide (NO) is **essential** for health, acting as a signaling molecule that regulates blood flow, blood pressure, and oxygen delivery. It plays a role in the nervous, endocrine, and immune systems and is recognized for its function as a vasodilator, helping blood vessels relax. Understanding NO's roles is crucial for healthcare providers since compromised NO production can lead to issues like high blood pressure, cognitive problems, and sexual dysfunction.

NO levels decline with age and lifestyle factors, highlighting the need for focus on preventative care. The report will discuss the implications of low NO levels on health and provide recommendations for improvement.

% Decline in NO Production



The State of NO Report

What Everyone Should Know About Nitric Oxide

Nitric Oxide (NO) is like the superhero of small molecules, swooping in to save the day for your body with a whole bunch of essential functions, especially when it comes to keeping your heart happy! This little gas snagged a Nobel Prize and the title of "the miracle molecule" for helping us figure out how blood vessels do their stretchy thing to keep blood pressure in check. Since that moment, scientists have uncovered NO's importance in a whole host of bodily systems!

Now, here's the twist: you can't just pop into a lab and measure NO like you would with your regular blood tests because it has a half-life shorter than your last phone battery - just 2-3 milliseconds! Made up of a single nitrogen and oxygen atom, NO is a free radical-fighting champion that helps keep inflammation in check, circulation prioritized, and signals various body processes like a boss of the body. Your body gets its dietary nitrate fix from food, which turns into NO, and guess what? You can measure how well your body's doing with NO using the super handy Berkeley Life patented salivary NO indicator test strips. More on that to come.



The State of NO Report

What Everyone Should Know About Nitric Oxide, cont.



The human body relies on Nitric Oxide for survival.

Nitric Oxide is integral to essential bodily functions that sustain life, including blood circulation for delivery of oxygen and nutrients to every tissue, immune responses, neural communication, metabolism, and tissue repair. By regulating blood flow, supporting immune defenses, enhancing brain health, and aiding cellular communication, nitric oxide acts as a fundamental survival molecule, underscoring why the body continuously works to maintain adequate NO levels.



The production of NO by endothelial tissues in cardiovascular and lymphatic vessels naturally decreases with age.

This age-related decline, known as endothelial dysfunction, is a gradual process and contributes significantly to the increased risk of cardiovascular diseases, hypertension, stroke, and related degenerative conditions seen in older adults. Reduced NO production occurs as a combined result of increased oxidative stress which damages endothelial cells and reduces NO output, coupled with reduced expression and function of endothelial NO synthase (eNOS), the enzyme responsible for NO production.



Enjoying a whole food diet and an active lifestyle can slow endothelial aging.

To slow endothelial aging and prevent dysfunction, it's important to maintain an antioxidant-rich diet with colorful fruits and vegetables to combat oxidative damage. Foods high in nitrates, like dark leafy greens and beets, boost NO levels. Berkeley Life NO Foundation provides food-sourced dietary nitrates for those lacking sufficient nitrate vegetables in their daily diets. Unlike nitrates from processed foods, these vegetable extracts are beneficial. Additionally, regular aerobic exercise improves endothelial function by stimulating NO synthesis and reducing oxidative stress, supporting heart health and overall wellness.

2024 Key Findings



Expanded Role in Immune Health

Recent studies have emphasized Nitric Oxide's crucial role in immune system regulation, particularly in defending against viral infections. Nitric Oxide helps inhibit viral replication, and its antimicrobial properties are now seen as a potential therapeutic target for antibiotic-resistant respiratory infections and for immune modulation¹.



Link to Cognitive Health

New insights have revealed that Nitric Oxide is essential for brain function. It plays a key role in neurotransmission, blood flow, and oxygenation to the brain. Reduced Nitric Oxide levels have been linked to cognitive decline and some neurodegenerative diseases, and other age-related cognitive and mental health issues².



Athletic Performance Impact

Nitric Oxide is recognized for enhancing athletic performance by improving blood flow and oxygen delivery to muscles, reducing inflammation, increasing endurance, decreasing fatigue, and aiding recovery³. This has led to its growing popularity in sports nutrition and fitness.



Nitric Oxide & Weight Loss

Nitric Oxide enhances circulation and may reduce inflammation, aiding weight loss for those with metabolic issues like insulin resistance. It improves glucose uptake and fatty acid oxidation, contributing to a more active, calorie-burning lifestyle⁴.



Gut & Oral Microbiome Balance

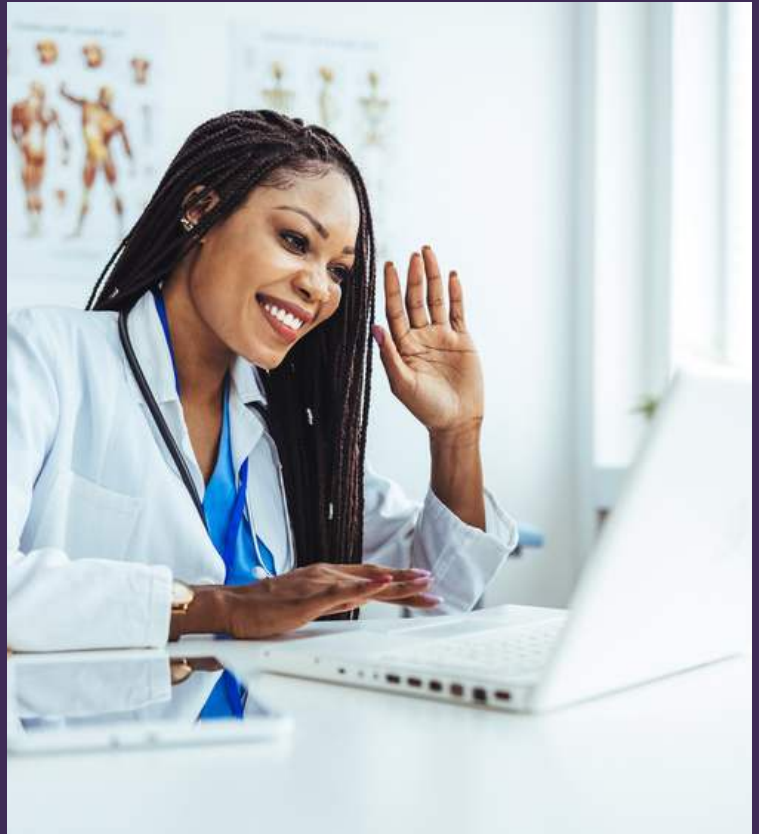
Ongoing research highlights the symbiotic relationship between commensal microbes in the human body and the role of dietary nitrates. In the mouth, bacteria convert nitrates to nitrites, which are further reduced to Nitric Oxide (NO) in the body⁵. NO, produced from intestinal microbes feeding on nitrates, exhibits antimicrobial properties, helping to inhibit harmful pathogens in the gut.

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Nitric Oxide for Healthcare Providers

For healthcare providers, grasping the multifaceted roles of Nitric Oxide (NO) within the tapestry of physiology—and discovering ways to enhance its presence—can be transformative for elevating patient outcomes, particularly in realms of cardiovascular, metabolic, immune, and neurological well-being.

We work with providers every day in our community of 2,500+ and have found the following to be some of the most common use (and success) cases that warrant attention to NO support:



Cardiovascular Health and Blood Pressure Management

- Nitric Oxide plays a critical role in vasodilation, and healthcare providers should recognize that supporting NO levels can improve blood flow and help lower blood pressure. Qualified healthcare providers providing prescription medication may find patients can lessen the need for pharmacological interventions by optimizing NO capacity.
- For patients with hypertension or cardiovascular disease, lifestyle and dietary strategies to enhance NO levels - like increased physical activity, weight management, and a diet rich in nitrates and antioxidants - can serve as adjuncts to pharmacologic treatment.



Nitric Oxide support is a critical addition to the daily wellness protocol of the autoimmune patient. Diet and lifestyle changes are maximized through optimal circulation – and supporting Nitric Oxide is the best way to ensure blood is flowing.

-Dr. Terry Wahls

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Nitric Oxide for Healthcare Providers

Impact of Aging on Nitric Oxide Levels

- Natural Nitric Oxide (NO) production declines with age, contributing to reduced vascular health, higher blood pressure, and greater risk of cardiovascular events. Providers should consider recommending preventive measures that preserve NO levels in older patients, including regular aerobic exercise, stress management, and specific dietary adjustments.
- Discussing NO boosters like Berkeley Life NO Foundation may be beneficial for patients over 40 years of age who cannot maintain optimal NO levels naturally.

Insulin-Resistance Conditions and Metabolic Health

- In patients with metabolic health issues, NO production can be impaired, contributing to endothelial dysfunction and insulin resistance. Healthcare providers should be mindful of this link and consider how improving NO bioavailability may aid in enhancing endothelial function and potentially improving glycemic control.
- Counseling on diet, exercise, and safe and efficacious NO-supportive supplements can be beneficial for managing metabolic health.
- Providers should address misconceptions about nitrate intake, differentiating between synthetically derived nitrates found in processed meats (linked with health risks) and naturally occurring nitrates from vegetables, which have cardiometabolic health benefits.

Backed by **Science**.
Powered by Nitric Oxide.

[View the Berkeley Life
Clinical Data Hub.](#)



We saw a noticeable difference when adding the Berkeley Life capsules into our procedures.

Blood flow and healing are critical to the success of our treatments, and the integration of Nitric Oxide has really helped.

-Dr. Richard Moore

The State of NO Report

Nitric Oxide for Healthcare Providers

Immunological Effects and Infection Defense

- Nitric Oxide (NO) has immune-modulating effects, signaling cytokine and chemokine activity to assist immune cells in fighting pathogens⁷. Providers can educate patients on how maintaining optimal NO levels supports a more effective immune response.
- In patients with autoimmune disease or chronic inflammatory conditions, excessively elevated NO from upregulated immune activity can exacerbate oxidative stress and inflammation. Supplying daily dietary nitrates and cofactors for assimilation creates a consistent, sustainable reservoir of circulating nitrate to balance endothelial production of NO, quenching a hyperactive immune response and reducing inflammation.

Neurological Health and Cognitive Function

- Nitric Oxide (NO) acts as a signaling molecule in the brain, supporting cognitive functions like memory and learning. Deficiencies or imbalances in NO can contribute to a decline in cognitive health and are implicated in neurodegenerative diseases⁸.
- For patients at risk of or experiencing cognitive decline, encouraging NO-supportive activities such as daily aerobic exercise and consumption of dietary nitrates, could help maintain neurotransmitter balance and cognitive function⁹.

Backed by **Science**.
Powered by Nitric Oxide.

[Discover more on the Berkeley Life blog.](#)



An excellent daily supplement to a healthy diet

(that) will increase physical and mental endurance AND performance.

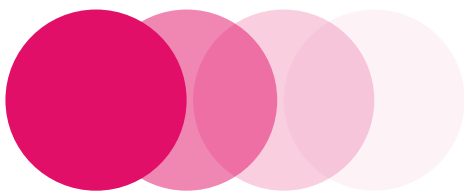
-Kelly R (happy customer)

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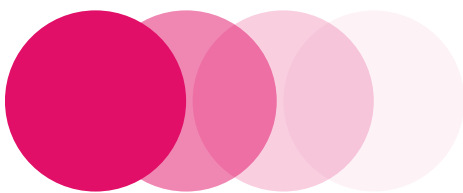
Addressing Patient Concerns

The preceding section illuminated the frequently acknowledged cases where practitioners initiate Nitric Oxide (NO) support for their patients; yet, the influence of NO on overall well-being extends far beyond.

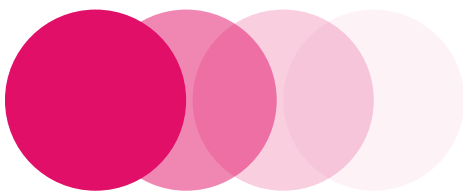
Drawing from the insights of both providers and patients, this section will unveil prevalent concerns that patients raise with their practitioners, which may find solace through the integration of NO therapeutics.



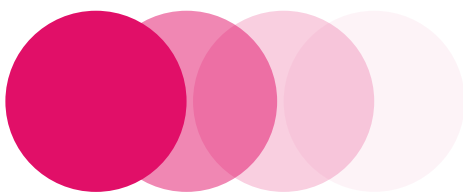
Sexual health



Cognitive health



Oral microbiome balance



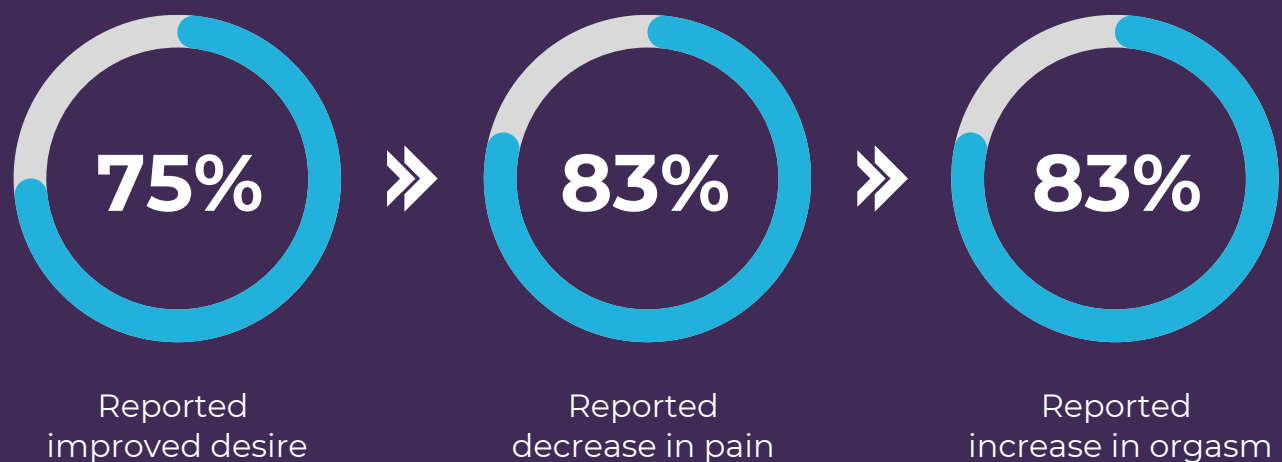
Weight loss



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Addressing Patient Concerns: Sexual Health

New clinical study pilot reveals the impact of Nitric Oxide on female sexual health.



Nitric Oxide plays a critical role in sexual health, particularly in regulating blood flow and enhancing arousal, both essential for optimal sexual function in both men and women.

In Men: Nitric Oxide (NO) plays a vital role in supporting healthy blood flow, which is essential for erectile function. It helps relax the blood vessels, allowing them to widen (a process known as vasodilation) to increase circulation. Reduced Nitric Oxide levels are associated with challenges in maintaining erectile function. This is why some treatments work by enhancing Nitric Oxide's effects on circulation¹⁰.

In Women: NO also helps improve blood flow to the genital area, supporting arousal and natural lubrication¹¹. Maintaining optimal Nitric Oxide levels can contribute to sexual wellness by promoting responsiveness and comfort.

Broader Benefits: Beyond its role in sexual health, Nitric Oxide supports overall vascular health, which can benefit individuals managing cardiovascular conditions, blood sugar concerns, and blood pressure. Restoring Nitric Oxide levels through diet, lifestyle changes, or supplements may support healthy circulation as part of a broader approach to managing these conditions.

The link between Nitric Oxide and wellness highlights its significance not only for heart health but also for enhancing quality of life in those seeking better vascular and sexual health throughout the aging process.

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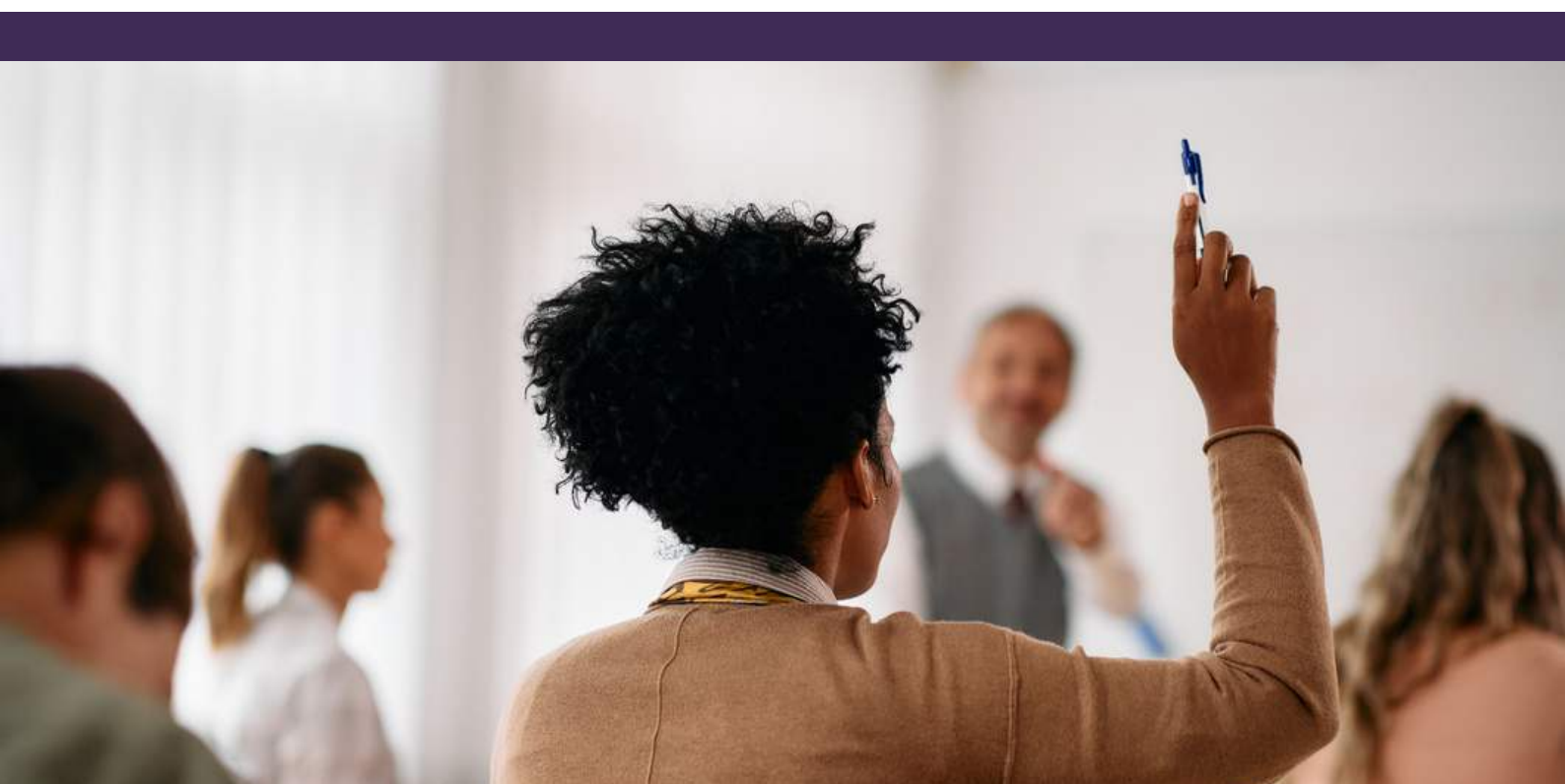
Addressing Patient Concerns: Cognitive Health

Nitric Oxide plays a key role in cognitive health, particularly through its effects on brain blood flow and neurotransmission.

Blood Flow and Brain Health: Nitric Oxide (NO) helps regulate cerebral blood flow by dilating blood vessels, ensuring the brain receives adequate oxygen and nutrients. Healthy blood flow is essential for maintaining brain function, memory, and overall cognitive performance. Reduced Nitric Oxide levels can contribute to impaired blood flow, which is associated with cognitive decline, particularly in aging populations.

Neurotransmission: NO also acts as a neurotransmitter in the brain, playing a role in cell communication and memory formation. It is involved in synaptic plasticity, the process that underlies learning and memory.

Cognitive Decline and Aging: As people age, NO production naturally declines, which can affect both brain function and vascular health. This decline may contribute to age-related cognitive impairments and increased risk of neurodegenerative conditions. Supporting Nitric Oxide levels through lifestyle interventions, such as diet and exercise, or through supplementation, may help improve or preserve cognitive function in aging patients.



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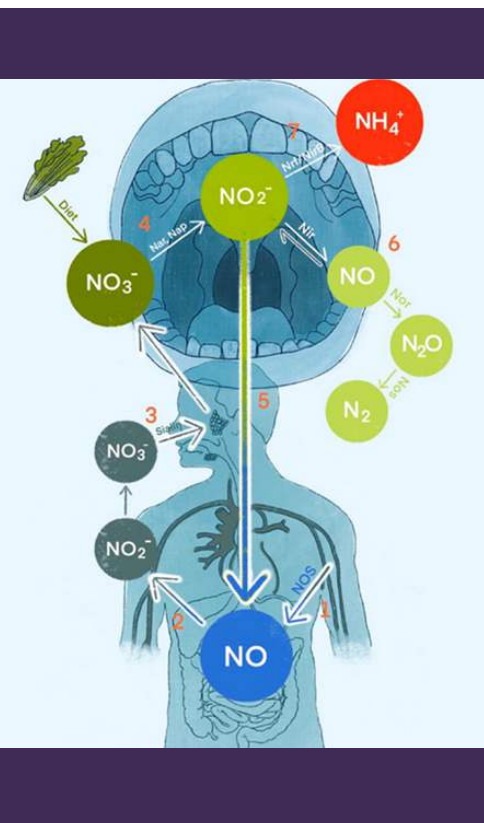
Addressing Patient Concerns: Balancing the Oral Microbiome

Nitric Oxide plays a crucial role in oral microbiome health, directly impacting oral hygiene.

Nitric Oxide Production in the Oral Cavity: The oral microbiome, particularly nitrate-reducing bacteria in the mouth, is essential for Nitric Oxide (NO) production. Several species of bacteria help convert dietary nitrates (from foods like leafy greens and beets) into nitrites, which are further converted into Nitric Oxide in the body¹². This process begins in the mouth, making oral health a critical factor in maintaining Nitric Oxide levels.

Impact on Oral Health: Healthy NO levels support good oral health by promoting blood flow to the gums, preventing long-term gum issues by reducing inflammation. Nitric Oxide also has antimicrobial properties, which help control harmful bacteria in the mouth that can lead to tooth decay and infections.

Link Between Oral Health and Cardiovascular Disease: There is a well-established connection between poor oral health and declines in systemic health, particularly cardiovascular diseases. Reduced Nitric Oxide production, often due to poor oral hygiene or the use of antibacterial mouthwashes that disrupt the oral microbiome, can lead to both oral and systemic health issues. A disrupted oral microbiome can decrease Nitric Oxide production, contributing to higher blood pressure and increasing the risk of cardiovascular disease¹³.



Ready to learn more?

[Check out our video series on Nitric Oxide and oral health.](#)

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Addressing Patient Concerns: Weight Loss

6 out of 10 Americans have a chronic disease¹⁴.

42% adult Americans are considered obese¹⁴.

9/10 Americans are not eating the necessary amount of vegetables¹⁴.

Nitric Oxide plays an emerging role in supporting weight loss by influencing metabolic function, energy efficiency, and exercise performance.

Metabolic Regulation: Nitric Oxide (NO) helps regulate insulin sensitivity and glucose metabolism, which are key factors in maintaining a healthy weight. By improving blood flow and enhancing the delivery of oxygen and nutrients to tissues, Nitric Oxide supports efficient metabolism⁴, allowing the body to burn calories more effectively. This is particularly important for those with insulin resistance or metabolic syndrome, where Nitric Oxide levels are often impaired.

Exercise and Fat Burning: NO enhances exercise performance by increasing blood flow to muscles, improving endurance, and reducing muscle fatigue. This allows patients to engage in more sustained physical activity, which contributes to increased calorie expenditure and fat loss. For individuals looking to lose weight, better exercise capacity means more effective workouts, which is a cornerstone of weight management strategies.

Reducing Inflammation and Supporting Healthy Weight: Inflammation can hinder weight loss efforts, particularly in patients with chronic conditions like obesity and diabetes. Nitric Oxide helps reduce inflammation by improving vascular function and promoting healthy circulation¹⁵. This can indirectly support weight loss by reducing the inflammation-driven barriers to fat metabolism and overall metabolic health.

The State of NO Report

For You: Daily Nitric Oxide Support

Berkeley Life offers a suite of Nitric Oxide (NO) Solutions designed to help monitor, improve, and sustain NO levels to optimize health, regardless of age or pre-existing medical conditions.

Berkeley Life NO Foundation was the first clinically-backed₁₆ NO supporting supplement on the market, and today remains the only product to demonstrate clinical effectiveness through reduced blood pressure, enhanced endothelial function, and reduced inflammatory biomarkers evidenced by a double-blind, placebo-controlled clinical trial.



Backed by Science

We work with industry-leading clinicians and peer-reviewed research to develop every product.



Clean, Quality Ingredients

We source only pure, high-quality ingredients free of harmful additives and artificial elements.



Made in The U.S.A.

We research, develop, and manufacture all our products in the U.S.A. in state-of-the-art facilities.

Berkeley Life provides clinically tested supplements specifically formulated to boost Nitric Oxide (NO) levels, primarily using plant-based nitrates sourced from vegetables like beets and leafy greens.

Berkeley Life products support cardiovascular health, energy levels, and blood flow, making them particularly beneficial for individuals looking to optimize health and vitality.

Berkeley Life's NO Foundation is intended to mimic the NO boost from a nitrate-rich diet, essential when natural NO production decreases with age.



Nitric Oxide Production Indicator Test Strips

- Berkeley Life's salivary test strips measure a clinically proven proxy of the body's Nitric Oxide (NO) levels, offering a quick, non-invasive way to monitor NO status at home.
- The strips work by reacting to nitrite levels in the saliva, which correlate with NO availability in the body. Higher readings on the strip generally indicate a sufficient NO level, while lower readings suggest a need for dietary adjustments or supplements.

Benefits of Monitoring Nitric Oxide Levels

- Regular monitoring with salivary test strips can help consumers maintain awareness of their Nitric Oxide (NO) levels, allowing for proactive attention to diet, lifestyle, and supplement intake to optimize health.
- This can be particularly beneficial for older adults, individuals with high blood pressure, or those with cardiovascular conditions, as they are often more likely to experience lower NO levels.

Proven & Efficacious

Berkeley Life NO supplements and test strips can be valuable tools, but they work best alongside a nitrate-rich diet (beets, leafy greens) and healthy lifestyle habits like regular exercise and stress management, which naturally support NO production.

The test strips offer immediate feedback, making it easier to see how diet and lifestyle adjustments impact NO levels and helping users stay motivated to maintain healthy habits.

A community 2,500+ healthcare providers strong (and counting)



1,000+ verified 5-star ratings



At Berkeley Life, our mission is to promote the importance of Nitric Oxide for healthy aging. We are here to ensure NO is infused into daily routines.

Our clinically proven products provide an easy boost that appeals to both doctors and patients. We aim to make Nitric Oxide an essential part of everyone's health toolkit for seamless daily use.

**Ready to see the results for yourself?
Email orders@berkeleylife.com for a
FREE 10-day trial pack.**

The State of NO Report

The Science Speaks for Itself

Berkeley Life is dedicated to advancing the science of Nitric Oxide (NO) and its impact on total health. We focus on evidence-based solutions to improve NO levels. Our products are rooted in rigorous clinical research, conducted in collaboration with leading healthcare professionals and academic institutions.

By prioritizing research, we ensure our products are both effective and safe, giving healthcare providers the data needed for informed patient care and patients' confidence in our products and their effectiveness. **Berkeley Life's commitment to clinical research drives innovation and contributes to the broader understanding of NO's role in improving health outcomes.**

The Berkeley Life Nitric Oxide Foundation's clinically proven benefits₁₆:

- Lowers Systolic Blood Pressure by **12.5 points**
- Lowers Diastolic Blood Pressure by **4.7 points**
- Improves Endothelial Function
- Clinically shown to improve A1c levels and C-Reactive Protein (CRP)

[CLICK HERE TO VIEW THE FULL STUDY.](#)



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1. Introduction

Cardiovascular disease (CVD) developed countries, accounting deaths each year and 31%

Abbreviations: CVD, cardiovascular disease; GCE, green coffee bean

2. Methods

2.1. Study population and randomization

Our study is a randomized placebo-controlled single center double-blinded study (NCT03909789). The research study is approved by Institutional Review Board (IRB) of the Lundquist Institute for Biomedical Innovation at Harbor-UCLA Medical Center. 67 eligible patients of men and women were enrolled after signing the informed consent forms after careful explanation and in-

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Original article

Effect of a plant-based bioequivalent inorganic nitrate (NO₃⁻) complex with vitamins, antioxidants and phytochemical rich food extracts in hypertensive individuals - A randomized, double-blind, placebo-controlled study

Lavanya Cherukuri, Divya Birudraju, April Kinninger, Bhanu T. Chaganti, Chandana Shekar, Sajad Hamal, Kashif Shaikh, Ferdinand Flores, Sion K. Roy, William Sotka, Shawn J. Green, Matthew J. Budoff

The Lundquist Institute for Biomedical Innovation at Harbor-UCLA Medical Center, Department of Cardiology, Torrance, CA, USA

SUMMARY

Background: This study assessed efficacy of plant based bioequivalent nitrate complex, consist of vitamins, natural antioxidants and phytochemical rich food extracts to elevate nitric oxide (NO) bioavailability as determined by saliva conversion of nitrate (NO₃⁻) to nitrite (NO₂⁻) a required step to produce NO, in relationship to lowering blood pressure (BP) in both men and women.
Methods: 67 individuals (26 men; mean age of 59.3 ± 9.0 yrs) with mean baseline systolic and diastolic BP > 120 and 80 mmHg respectively were randomized to receive daily dosing of 314 mM NO₃⁻ or NO₃⁻ free (placebo) tablets in double-blinded study for 12 weeks (wks). Inorganic NO₃⁻ tablets consist of NO₃⁻ rich beetroot extract, thiamine nitrate, and potassium nitrate in the presence of ascorbic acid, to facilitate NO bioavailability.

Results: The primary endpoint of the study was reduction in BP at 12 wks by improving endothelial function. At study conclusion, mean ± SD reduction in systolic BP (SBP) in the inorganic NO₃⁻ group was 12.5 ± 13.3 mmHg (*p* = 0.0007), as compared to 6.19 ± 11.39 mmHg (*p* = 0.004) in the placebo group, for a placebo-corrected reduction of -6.31 mmHg (95% CI 10.89 - 2.31, *p* = 0.04). NO₃⁻ also reduced diastolic

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L. Cherukuri et al. / Clinical Nutrition ESPEN 40 (2020) 127–135

associated with endothelial dysfunction, which is an early step in the pathogenesis of atherosclerosis [6–12]. Endothelial cells have both vasodilator and vasoprotective properties by releasing the substances called endothelium-derived relaxing factor and nitric oxide (NO) [13].

NO is a potent vasodilator and also protects the vessel wall against the development of atherosclerosis and thrombosis by inhibiting platelet aggregation, smooth muscle cell migration and proliferation, monocyte adhesion and adhesion molecule expression [13–15]. It has recently emerged that these cardioprotective effects may be attained by naturally occurring dietary inorganic nitrate (NO₃⁻), via increasing the bioavailability of NO. Green leafy vegetables are a great dietary source for this inorganic NO₃⁻ [16–18]. There are numerous initiatives designed to promote increased fruit and vegetable intake, including the Dietary Approaches to Stop Hypertension (DASH) diet in the US [19]. DASH diet, sodium restriction, and exercise have been shown to reduce SBP by 8–14 mmHg, 2–8 mmHg and 4–9 mmHg, respectively [20]. In addition, recent studies showed that dietary supplements such as aged garlic extract, antioxidants like ascorbic acid, polyphenol rich foods (i.e. pomegranate juice and green coffee bean extract (GCE)) have been known to have a positive effect on CVD risk factors, including BP, cholesterol, and endothelial function by increasing the bioavailability of NO [20,21–23]. Unfortunately, despite attempts to promote vegetable consumption via such initiatives, compliance to these diets is poor. Even after dietary counseling in a 3-month randomized, intervention study, only 21% of participants achieved a suitable daily consumption of fruit and vegetables [24]. This poor compliance is related, in part, to the time required to prepare these foods and/or the cost implications [24]. While more convenient nitrate containing vegetable juices are readily available, many individuals avoid these due to their cost and undesired taste. Consequently, there is a need for a readily available, affordable and convenient inorganic NO₃⁻ containing supplement alternative, capable of providing the desired BP lowering effect by increasing the bioavailability of endogenous NO.

Previous studies have demonstrated that NO potent vegetables, such as leafy greens and beets, rich in inorganic NO₃⁻, increased the bioavailability of NO, lowering blood pressure as effectively as hypertensive medication [25–28]. For many years there has been considerable uncertainty and controversy surrounding the non-pharmacological approaches to lower BP, such as dietary supplements. Our study investigates whether plant-based bioequivalent dietary inorganic NO₃⁻ supplement can play a preventive role in reducing blood pressure by restoring the endothelial function in HTN individuals with the risk of CVD.

2. Methods

2.1. Study population and randomization

Our study is a randomized placebo-controlled single center double-blinded study (NCT03909789). The research study is approved by Institutional Review Board (IRB) of the Lundquist Institute for Biomedical Innovation at Harbor-UCLA Medical Center. 67 eligible patients of men and women were enrolled after signing the informed consent forms after careful explanation and in-

formed consent. After randomization, participants will return at 2 wks and 12 wks to assess for any side effects. Between the visits, we have an inter-trial phone visit to ensure study medication adherence and compliance.

2.2. Exclusion criteria

We excluded patients with known history of coronary artery disease (CAD) (*n* = 2), myocardial infarction (MI) (*n* = 1), stroke or life-threatening arrhythmia within the prior 6 months (*n* = 1), New York Heart Association Functional Classification II–IV heart failure (*n* = 2), renal impairment (serum creatinine > 1.4 mg/dL) (*n* = 3), current tobacco use (*n* = 2), history of bleeding disorders or use of anticoagulants (*n* = 1), hypertensive encephalopathy or cerebrovascular accident (*n* = 1), or who were currently enrolled in another placebo-controlled trial (*n* = 0).

2.1. Evaluation of cardiovascular risk factors

At baseline family history of heart disease, smoking history, medical history and current medications were collected in all the participants. Systolic blood pressure (SBP) and diastolic blood pressure (DBP) were recorded after resting for 5 min with back support, feet flat and arm bared at heart level prior to any blood pressure measurements and Body Mass Index (BMI) was calculated. Three BP readings were recorded on both right and left arm and the average BP of both arms was considered for eligibility criteria at baseline. Similar measurements of BP readings were recorded after 2 h (post-dosing of study BP), 2 wks and at 12 wks with daily administration of active or placebo. Plasma and saliva NO₃⁻ and NO₂⁻ were measured along with BP readings.


All participants will be instructed to abstain from smoking, alcohol, use of mouthwash and food intake, e.g., overnight fasting or at least 10 h before sample drawing. Sample were stored at -70 °C and analyzed for C-reactive protein (CRP), creatinine, serum glucose, hemoglobin A1c (HbA1c) and a lipid profile, including serum LDL cholesterol, HDL cholesterol, and TG, with the use of automated diagnostic equipment (DLS Laboratories).

Plasma and saliva samples were collected and frozen at -80 °C for determination of NO₃⁻ and NO₂⁻ using a modified chemiluminescence technique as previously published [29]. NO₃⁻ and NO₂⁻ were determined by the reduction of NO metabolites (NO = NO₃⁻ + NO₂⁻). Plasma and saliva samples were obtained at baseline (fasting) and at 2 h, 2 wks and 12 wks after administration of inorganic nitrate/placebo with food and water.

Saliva Nitric Oxide Test Strips was provided by The Berkeley Saliva Nitric Oxide Test Strips (Chicago, IL) and reader or manual log along with appropriate training and instructions on use, were provided to all participants. Berkeley strips are based on the modified Griess reagent reaction which correlated with the presence of salivary NO₂⁻. NO₂⁻ is not measured by the strips, whereas the conversion of NO₃⁻ to NO₂⁻ in oral cavity is detected by the strips. Saliva Strip test was conducted twice daily, upon awakening and 2 hours' post-administration of the active/placebo dietary NO₃⁻ tablet by participants. In short, the test strips require the participant to place the test strip on the surface of the tongue for


The State of NO Report

Berkeley Life Year in Review



Enhanced Customer Service Experience

We launched a new, streamlined customer service system, designed to offer faster support and improved satisfaction for both providers and customers.



Website Experience Revamp

Our updated website delivers a more user-friendly experience, making it easier to access information, shop products, and engage with educational content.



Clinical Research Expansion

This year, we initiated new clinical trials to further investigate the benefits of Nitric Oxide for male and female sexual health, proving our dedication to science-backed solutions.



New Product Launches

We introduced two new offerings —The Daily Foundation Kit and The Total Support Kit, providing comprehensive solutions for maintaining optimal Nitric Oxide levels in an easy-to-integrate system.



Events and Education

Berkeley Life hosted 20 events, delivered 36 keynotes and presentations, and conducted 16 webinars to share the latest insights on Nitric Oxide with healthcare professionals and the public.

NEW! Private Label Launch

We expanded our offerings with the introduction of a private label program, allowing healthcare providers to offer our flagship product under their own brand.

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Thank you for exploring The State of Nitric Oxide Report. We hope this report has deepened your understanding of Nitric Oxide's essential role in health and wellness.

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