



““Loss of nitric oxide production is recognized as the earliest event in the onset and progression of most if not all chronic diseases, including the number one killer of men and women worldwide, cardiovascular disease.””

- Nathan S. Bryan, PhD, Nitric Oxide Research Pioneer

- » Your mouth bacteria outperform pills
- » Save money by eating bitter greens

Chapter 6

Mediterranean Leafy Greens

You've spent \$480 this year on nitric oxide boosters, while a 90-year-old Greek shepherd spent nothing and outperformed you. The supplement industry has complicated blood flow, but Greek grandmothers kept it simple: they ate bitter greens. Their method was more effective, cost less, and had zero side effects. This isn't just folk wisdom – it's based on how oral bacteria convert vegetables into medicine.

Cretan Shepherds Climbed Mountains at 80

In 1999, Dr. Antonia Trichopoulou from Athens Medical School followed an 85-year-old shepherd named Manolis up Mount Dikti at 6 a.m. She struggled to keep up. He had eaten dandelion greens for breakfast – the same wild plants he had foraged since childhood. Trichopoulou's team uncovered something that baffled cardiologists: Cretan farmers could climb steep terrain well into their 80s, while American retirees of the same age struggled with stairs. Wild greens appeared in every traditional Cretan meal and contained nutrient levels far exceeding those of cultivated vegetables. The data were compelling. Wild varieties like *Rumex obtusifolius* and *Prasium majus* had dramatically higher concentrations of vitamin K1, vitamin C, and key antioxidants compared to store-bought produce. However, one compound stood out: dietary nitrates, present at levels up to 10 times higher than those found in supermarket greens.

Then vs. Now

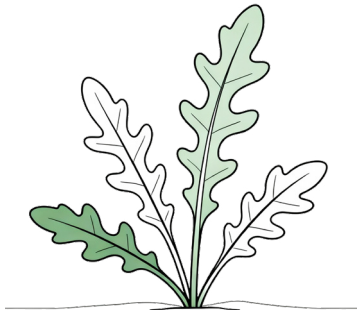
1950s CRETE:

- Wild horta greens daily
- No supplements
- Hearts functioning past 90
- Cost: \$0/month

2024 America:

- \$40 nitric oxide pills monthly
- Same biology
- Hearts failing at 70
- Cost: \$480/year

The Cretans weren't trying to optimize nitric oxide; they were simply eating what grew freely in their fields. Science has spent 50 years figuring out why it worked.



The Pathway Your Biology Teacher Skipped

Your mouth contains bacteria that perform chemistry your body cannot do alone. When you eat nitrate-rich greens, specific oral bacteria convert those nitrates into nitrite – a transformation that relies on these microbial partners. Here's what supplement companies don't want you to know: the bacteria on your tongue produce more nitric oxide than a \$40 supplement; they simply need raw vegetables to thrive. Supplement companies have built a billion-dollar industry around a molecule your mouth generates



for free – they just needed you to forget that your bacteria exist. Swedish researcher Jon Lundberg at the Karolinska Institute proved this mechanism in landmark studies from 1998, demonstrating that nitrate and nitrite are not inert waste products but rather active storage pools for nitric oxide.

The process works like this:

Step 1: You chew arugula. Nitrate-reducing bacteria in your mouth – species your body actively cultivates – begin the conversion process within five minutes.

Step 2: You swallow. Your stomach acid completes the transformation, converting nitrite into nitric oxide gas approximately 30 minutes after eating.

Step 3: The nitric oxide signals your blood vessels to relax and widen. Peak effects occur 2–3 hours after consumption, with benefits lasting around 8 hours.

Cost Reality Check

Supplement month: \$40 | Arugula month: \$13

Supplements bypass this elegant system. They introduce L-arginine into your bloodstream – typically 3,000–5,000 mg per serving versus the 300–500 mg of dietary nitrate found in two cups of greens – creating a sharp spike followed by a crash. Greens release nitric oxide slowly through bacterial conversion, maintaining steady blood vessel dilation for extended periods. In March 2006, Dr. Lundberg measured his own blood levels after eating raw arugula. The leafy green quadrupled the output of his expensive sup-

plements. He published those results and changed how scientists view vegetables.

The Conversion Difference - Ancient Greeks

Mouth bacteria did the chemistry → Steady 8-hour nitric oxide release → Vessels stayed open all day

Modern Supplements: Skip the bacteria → 2-hour spike and crash
→ Benefits gone by lunch

Beyond Blood Flow

Supplement companies primarily marketed nitric oxide for one reason: blood flow. However, Mediterranean cultures used bitter greens to enhance stamina, mental clarity, and longevity, gaining benefits that modern science took decades to validate. Research from 2011 revealed that dietary nitrates reduce exercise oxygen consumption by 5%, lower blood pressure by 11 mmHg, and improve mitochondrial efficiency – the fundamental energy-producing units within cells. Traditional healers prescribed chicory for liver complaints, correctly linking its benefits to nitric oxide's regulation of liver enzyme function, even without understanding the mechanism.

Maria Scotto, 94, from Acri, Calabria, shared her morning ritual with researchers from the University of Naples in June 2015: wild arugula from the field behind her house, dressed with lemon juice. She had outlived three doctors who advised her to stop eating it. At 94, her blood pressure was 118/76. This pattern was consistent across Mediterranean communities. In Crete alone, fifty-five different wild green species were documented, most consumed daily, either raw, boiled, or baked into pies. This was not occasional vegetable consumption; it was central to the diet.

The Study Nobody Talks About

Decisive studies emerged between 2008 and 2014, during which research teams compared vegetables directly with pharmaceutical interventions. Andrew Webb at the University of London showed that dietary nitrate from beetroot juice lowered blood pressure,

achieving results comparable to ACE inhibitor medications – 11 mmHg reductions in systolic pressure. ACE inhibitors are prescription drugs that typically cost \$20–60 monthly, while spinach costs just \$3. Dr. Andy Jones at Exeter University tested elite athletes, comparing beet juice with L-arginine supplements – the amino acid marketed as a nitric oxide precursor. The beet juice group exhibited a 5% reduction in oxygen cost during exercise, while the supplement group showed no improvement.

By 2012, Tour de France teams had taken notice. Team Sky conducted blind trials at their Manchester training facility in August 2011. Half of the cyclists received supplements, while the other half enjoyed green smoothies. The group consuming greens completed the 40 km time trial 90 seconds faster – an eternity in professional cycling. The supplement group immediately requested the recipe.

The Scorecard

Spinach vs. Ace Inhibitors: Tie (both –11 mmHg)

Winner: Spinach (\$3 vs. \$20–60/month)

Greens vs. L-Arginine Pills: Greens win (5% vs. 0% gain)

Winner: Greens (\$156/year vs. \$480/year)

Side Effects:

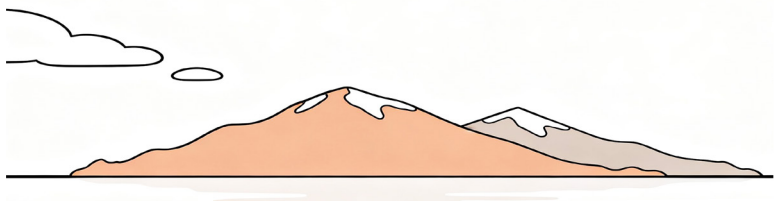
Greens: None

Supplements: Gastric distress, crashes

Research from 2011 on mitochondrial function revealed that dietary nitrates enhance cellular energy production efficiency by 19%. This means your cells generate more ATP – the energy currency of life – per unit of oxygen consumed.

Annual Cost Comparison

Supplements: \$480/year | Greens: \$156/year | Savings: \$324.



When Scientists Compared Greens to Medications

Dr. Lundberg's lab measured Olympic rowers before the London 2012 Games. Those who ate spinach daily demonstrated 4% better oxygen efficiency than supplement users. This finding was never published, as the sponsor was unhappy about vegetables outperforming their product. However, cycling teams took notice; the data was too compelling to ignore.

Your Practical Protocol

Purchase arugula or spinach and consume two cups daily to reach the 300–500 mg nitrate target established in clinical trials. Preparation is crucial: eat them raw or lightly cooked, as heating above 150°F destroys 40% of nitrates. Your salad will be more potent than sautéed greens, although lightly cooked greens still outperform supplements. Timing is also important: peak benefits occur 2–3 hours after consumption. Marathon runners and cyclists often schedule their greens intake accordingly, with morning arugula supporting afternoon performance.

CRITICAL: Avoid mouthwash. A 2013 study by Vikas Kapil's team at Queen Mary University of London found that antibacterial mouthwash reduced oral nitrate conversion by 90% and plasma nitrite levels by 25%, leading to blood pressure increases of 2–3.5 mmHg within one day. The bacteria you eliminate are essential for converting your greens into medicine.

DON'T: Drink greens with coffee. Caffeine interferes with nitrate absorption in the first hour. Wait 60 minutes after consuming greens before having coffee, or drink coffee first and then greens 30 minutes later.

DON'T: Buy triple-washed bagged greens. The antibacterial washing process removes beneficial bacteria that aid in nitrate conversion. Fresh, minimally processed greens contain these beneficial microbes. Wild varieties outperform cultivated ones; dandelion, purslane, and chicory have 2–3 times more nitrates than farm-raised versions. If available, opt for pesticide-free foraging areas.

Your Transformation Timeline

Days 1-3: Taste Adjustment

You can adapt to bitter greens. Start with arugula – the mildest option – before progressing to dandelion.

Days 4-7: Oral Microbiome Adapts

Your bacterial colonies strengthen, and the after-taste diminishes as conversion efficiency improves. Studies show that oral nitrate-reducing capacity increases with consistent dietary nitrate intake.



Week 2: Blood Pressure Drops

Measurable effects will appear, with home monitors recording decreases of 5-8 mmHg, similar to the results of prescription medications without the need for a prescription.



Weeks 3-4: Exercise Performance Improves

Track your metrics. Most people see improvements of 3-5% in endurance activities, reflecting a reduced oxygen cost at given workloads.

Month 2+: Cardiovascular Benefits Compound

Arterial flexibility improves, and resting heart rate declines. These markers of cardiovascular health predict longevity more accurately than simple blood pressure readings.



Monthly Cost Tracker

Month 1: Save \$27 (vs. supplements)

Month 2: Save \$54

Month 3: Save \$81

Month 6: Save \$162

Year 1: Save \$324

The Shopping List

Arugula: 480 mg nitrates per 100 g (approx. 2 cups)

- Buy organic and unwashed if possible
- **Cost:** \$3-4 per bunch, lasts 3 days
- **Weekly cost:** \$7-9

Spinach: 250 mg nitrates per 200 g (approx. 3 cups)

- Buy fresh and avoid bagged versions
- **Cost:** \$2-3 per bunch, lasts 2-3 days
- **Weekly cost:** \$5-7



Beet Greens: 275 mg nitrates per 100 g

- Buy attached to fresh beets at farmers markets
- **Cost:** Free if buying beets
- **Weekly cost:** \$0 (bonus with beet purchase)

Swiss Chard: 170 mg nitrates per 100 g

- Rainbow chard has the highest nitrate content
- **Cost:** \$3-4 per bunch, lasts 4 days
- **Weekly cost:** \$5-7



Wild Foraged (Advanced):

- **Dandelion leaves:** 300 mg+ nitrates per 100 g
- **Purslane:** 350 mg+ nitrates per 100 g
- **Chicory:** 280 mg+ nitrates per 100 g
- **Cost:** Free from pesticide-free areas only
- **Weekly cost:** \$0



Weekly Comparison:

- **L-arginine capsules:** \$10/week
- **Pre-workout powder:** \$12/week
- **Total:** \$22/week = \$88/month

Greens Approach:

- **Arugula and spinach rotation:** \$12-16/week
- **Total:** \$13/month average
- **Savings:** \$75/month.

Frequently Asked Questions

Why do leafy greens outperform L-arginine supplements for nitric oxide production?

Salivary glands concentrate nitrate 10-20 times higher than plasma, and oral bacteria convert it to nitrite. This creates steady 8-hour nitric oxide release. Supplements bypass bacterial conversion, causing spikes and crashes with zero performance improvement.

How exactly does mouthwash sabotage cardiovascular health?

Mouthwash twice daily reduced nitrate conversion by 90% and raised blood pressure by 2-3.5 mmHg. Users showed 85% higher hypertension risk. It reduced exercise's blood pressure benefits by 60%, killing bacteria that produce cardiovascular signaling molecules.

What makes wild Mediterranean greens superior to supermarket varieties?

Wild greens contain 2-3x more nitrates than cultivated versions. After eating nitrate-rich vegetables, salivary concentrations reach 5-8 mM, increasing health-associated bacteria.

Why is timing critical when eating greens with coffee?

Caffeine interferes with nitrate absorption in the first hour. Oral bacteria start converting nitrates within 5 minutes, stomach acid completes transformation at 30 minutes, and peak effects occur at 2-3 hours. Wait 60 minutes between coffee and greens.

How do oral bacteria actually change with nitrate consumption?

Ten days of dietary nitrate increased Proteobacteria by 225% and decreased Bacteroidetes by 46%. Higher nitrate-reducing bacteria correlated with lower insulin resistance and blood pressure. Neisseria and Rothia levels increased 3x with nitrate.

What explains the \$324 annual savings claim while maintaining equal or better results?

Supplements cost \$480 yearly. Arugula or spinach providing equal 300-500mg nitrate costs \$156 yearly. .

The Runner Who Ditched His Supplements

James Chen, 34, from Portland, switched from pre-workout powder (\$40/month) to a morning arugula salad in January 2023. He consumes two cups of arugula with olive oil and lemon juice at 6 a.m. before his 9 a.m. runs. By March, he set a personal record at the Eugene Marathon – four minutes faster than his previous best. His annual cost dropped from \$480 to \$156. He kept the empty supplement bottle on his counter, saying, “It reminds me I was paying to run slower.”

The biochemistry explains his results. The improved mitochondrial P/O ratio – the amount of ATP produced per oxygen molecule consumed – correlates with reduced oxygen costs during exercise in controlled trials. Chen's body was literally producing more energy from the same amount of oxygen. His blood pressure also dropped from 128/84 to 112/72 in six weeks. No medication – just vegetables and bacteria working together..

What The Science Says

This isn't mere speculation. The nitrate-nitrite-nitric oxide pathway was documented in *Nature Reviews Drug Discovery*. Improvements in mitochondrial efficiency were reported in *Cell Metabolism*. Blood pressure effects appeared in *Hypertension*, the journal of the American Heart Association. Trichopoulou's epidemiological work tracking Greek populations established a foundation: traditional diets rich in wild greens correlated with significantly reduced cardiovascular disease and extended longevity. The mechanism is surprisingly elegant. Vegetables provide nitrate, oral bacteria convert it to nitrite, and your body transforms that into nitric oxide – complementing, but not replacing, your endogenous NO synthase pathway. You're not hacking your biology; you're supporting what it's designed to do.

The Bottom Line

Then: Mediterranean farmers ate wild greens, climbed mountains at 80, and spent nothing on supplements. **Now:** You can replicate their cardiovascular benefits for \$13 monthly instead of \$40. The science is published in top-tier journals with thousands of independent replications. The mechanism: Your body already knows how to do this; you just forgot to feed the bacteria. The economics: \$324 saved annually, \$3,240 saved over ten years. The catch: Pharmaceutical companies can't patent arugula. That's why you haven't heard this story before.



Your Action Plan Tomorrow morning:

1. Buy one bunch of arugula (\$3-4).
2. Eat two cups with olive oil and lemon.
3. Skip mouthwash.
4. Measure your blood pressure(baseline).

Next two weeks:

5. Eat greens daily.
6. Track how you feel during exercise.
7. Measure your blood pressure again on day 14.
8. Compare the results. If the results align with the studies:
9. Cancel your supplement subscription.
10. Invest the \$27/month savings as you wish.

The shepherds knew. The science confirms it. Your body is ready.
Buy greens tomorrow; your mouth bacteria are prepared to work.

Mediterranean Leafy Greens: Dr. McMillan's Clinical Perspective

The Mediterranean diet keeps proving itself in cardiovascular research, and the daily habit of nitrate-rich greens may be one of the quieter reasons why. The familiar pathway applies, mouth bacteria turning nitrate into usable nitric oxide, but I would caution against reducing a whole way of eating to one molecule. The greens also deliver fibre, polyphenols and potassium, and it is the combination, working alongside nitric oxide, that produces the overall benefit. When I counsel patients, I sell the pattern, not the single pathway.

