

KALE

.....

The Complete Guide to the World's Most Powerful Superfood

STEPHANIE PEDERSEN



**MORE THAN
75 DELICIOUS
RECIPES
FOR OPTIMAL
HEALTH**

OMEGA-3 • VITAMIN A • VITAMIN K • MANGANESE • FIBER

Kale

The Complete Guide to the World's Most Powerful Superfood

STEPHANIE PEDERSEN, MS, CHHC





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INTRODUCTION

I came late to kale. My Danish cousins ate it in Aunt Jensen's grønkålssuppe. My friends from Scotland and Wales and Ireland and Sweden and Germany and Poland and Russia grew up eating it. Thousands of generations of European peasants, soldiers, artisans, royalty, merchants, men, women and children were nourished by it.

But me? I was an adult before I even laid eyes on the leafy stuff. That may be because I spent my early years in Australia and California, surrounded by non-leafy vegetables. Or, it could be that, like many children of the 1970s and '80s, the only vegetables I ate came from a can and were usually green beans, peas, peas 'n carrots, tomato sauce, or beetroots, with the occasional fresh cob of corn or head of iceberg lettuce.

My first hands-on experience with kale came when I was in my 20s and working in New York City as a kitchen assistant at the Natural Gourmet Institute, the renowned whole foods cooking school where revolutionary natural foods chefs such as Peter Brearley, Myra Kornfield, Elliot Praag, and Dianne Carlson taught.

Kitchen assistants are the people who help cooking instructors get ready for a class by prepping the ingredients and doing the backstage work during a cooking class. That particular day, a note was waiting for me and two others: "Wash and dry all bunches of kale." Despite a childhood spent tending to my parents' berry patch and fruit trees, I couldn't identify which of the gorgeous leafy bundles in front of me was kale.

I turned to another assistant, who shrugged. The third assistant, also unsure, shook his head. Finally, the chef wandered in, saw our confusion, and gave us a quick lesson in kale. The dark, nubbly leaves were Lacinto kale from northern Italy. The tightly ruffled leaves were everyday curly kale. The kale with the magenta rib, was red kale.

Over the course of the next four hours, the three of us eagerly learned how to clean kale, prep it, cook it, and use it. We learned it was one of the most nutrient-dense veggies around and that it was just as good in soups as it was sautéed in coconut or olive oil.



We also learned the subtle differences of the different types. That it tasted sweeter after a frost. That it grew in the Northern Hemisphere. That it was an ancient member of the cabbage family, more ancient than cabbage itself and the vegetable most other brassica family offspring (such as broccoli and kohlrabi) had descended from. That hippos in the Washington, D.C. zoo ate more than 10 pounds of kale each per day. That the Irish made something called colcannon out of it.

Wanting to get every drop of wisdom we could on this new-to-us veggie, we assigned one of us to take frantic notes while the other two of us worked the kitchen.

After that class, I headed for the farmer's market to stock up, then to the library to check out every cookbook I could find that contained kale recipes. I tried a different kale recipe nearly every day, all the while thanking my luck for having a husband who likes kale! After two months, I got bored. Attempting to shake things up, I began writing some of my own kale recipes.

I adored the way this mighty brassica tasted—bitter and smoky, pungent and slightly sour. Deeply earthy and nourishing. I loved its meaty texture. I was in awe of the omega-3 fatty acids, fiber, phytonutrients, vitamins, minerals, and all of the other good things this leafy green contains. The vegetable felt substantial and fortifying.

What all this experimentation showed me is that kale is gloriously versatile. I began using kale as the basis of vegan, vegetarian, and non-vegetarian main dishes. I started to garnish with kale. I use it today as a salad, as a side veggie, as a snack, and in drinks and soups and sauces. I have even been known to use it in a floral arrangement, as a centerpiece, and as packing material (the curly leaf is best for this!).



Along the way, I learned a few wonderful things firsthand:

- Kale can make your skin look phenomenal, due to its high content of skin-beautifying omega-3 fatty acids, antioxidants, and vitamins A, C, and E. I was no longer experiencing monthly breakouts, my crow's feet softened, and some of the sunspots on my face faded or disappeared.
- Kale provides a sustained energy and increased physical stamina, due to the omega-3 fatty acids.
- Kale helps joints feel better and promotes faster healing between sessions of heavy exercise thanks to vitamin K, omega-3 fatty acids, and an outstanding number of anti-inflammatory flavonoids. For me, this meant I could go running four days a week without pain.
- Kale's generous fiber content fills the tummy, which left me feeling so satisfied I wasn't interested in after-meal snacking.
- The high beta-carotene content has been linked with improved eyesight. My own fuzzy low-light sight improved after two weeks of eating kale on a daily basis.

- Improved immune system function. Before adding kale to my diet, I caught one cold every four to six weeks. After eating a serving of kale each day, I caught two colds during an entire year. The veggie's antioxidant content is the reason.
- While I don't have personal experience with the following conditions, my kale research uncovered mountains of studies on kale's numerous nutrients and how they help prevent and heal heart conditions, high cholesterol, cancer, and diseases of the gall bladder and liver.

And, perhaps most important to my personal life, kale also helps your body powerfully and quickly get rid of toxins and old wastes.

Pregnant during the 9/11 World Trade Center attacks, I was exposed to a massive amount of toxins. I passed these on to my son, who was born with off-the-charts levels of heavy metal poisoning.

It took me a few years to learn that heavy metal poisoning was behind my child's perplexing symptoms (a complex mix of skin, digestive, sensory, sleep, and mood disorders). Once I got to the bottom of his health crisis, I began working hard to rebuild his immune system and naturally and gently detox his small body. Kale puree was one of our mainstays. I hid it in smoothies and marinara sauce. I made green eggs and mashed potatoes. I minced kale leaves into soup and meatballs and porridge of brown rice, millet, and quinoa.

I increased my own kale intake to help rid myself of the metals I'd acquired while pregnant. Today we're both clean and healthy, in large part due to this ancient food's super healing abilities.

Kale is indeed a "superfood," and a popular one at that. While it hasn't yet surpassed potatoes as America's favorite vegetable, you can check out any raw food blog, vegan restaurant, vegetarian magazine, or alternative health Web site and find "unofficial proof" that kale is the darling of the health set.

I have my own unofficial proof that kale is the health world's most popular vegetable: At one point in my career I worked as a writer for the Institute of Integrative Nutrition in New York City. One of my duties was to compose alumni bios for the school's Web site. I would send each IIN graduate a questionnaire, read through their answers, edit them, and post the answers online for other people to see. When asked "What is your favorite health food?", 195 out of about 200 people said "kale."

Just to make my proof a little more official: I began quizzing my nutritionist and natural health friends. My alternative healer friends. My acupuncturist, massage therapist, chiropractor, Reiki healer, and several personal trainers. Yoginis. Raw foodists. Feng shui masters. Vitamin supplement peddlers. People standing behind me in the Whole Foods' checkout line.

Every single one of them had the same favorite vegetable: Kale.

I suppose I could have found more people to ask, but the above was enough for me. In my opinion, kale is the country's favorite superfood. For so many reasons.

Keep reading to learn what these reasons are!

Love and kale chips to you all,

Stephanie Pedersen, MS, CHHC AADP Holistic Nutritionist



GETTING FRIENDLY WITH KALE

Hello kale lovers! I am so excited to share my favorite veggie with like-minded foodies. And welcome also, to you healthy folks who have heard that kale is a great way to uplevel your health. And lastly, friendly greetings to those of you out there who cannot stand kale, but are here because you love someone who loves kale, or your doctor or nutritionist told you that you need to be eating more green veggies, or you want to make sure your family gets the greens they need to be their best.

Kale comes in several colors, sizes, and leaf styles, including the popular curly (also known as ruffled or frilled); the shiny, smooth leaves (such as Lacinto kale); and the red-hued, lobed leaves (such as red Russian kale). By all means experiment with the different types. You may be like me and love all varieties equally. Or, you may find you prize one type above the rest. All have near-identical nutritional profiles and that green, earthy taste you expect from kale. All can be used interchangeably in kale recipes. And all should be chosen and stored following the same guidelines.

KALE'S ILLUSTRIOUS HISTORY

Wild kale was first found growing in cool, sandy soil in the Eastern Mediterranean (though some researchers say Asia Minor was kale's first home). Early kale was a scraggly, leggy plant. As humans became aware of its deliciousness and its ability to create and maintain health, they began seeking the plant out, gathering its seeds and planting their own stash of kale. They also began trading the seeds with people of other regions and carrying the plant through other lands in the rations of soldiers and explorers, spreading the plant up into Europe and the British Isles, over to Russia, and even across the sea to North America.

For those of you who prefer tender, mild-tasting kale, opt for bunches with smaller-sized leaves which are younger and less fibrous than their larger, more mature siblings. Note that although kale is now available throughout the year, the sweetest, mildest greens are available during the plant's peak which is from winter through the beginning of spring.

Regardless of the size of leaves or varieties you choose, however, one of the best, most foolproof ways to be sure your loved ones (you included!) eat their weekly servings of kale is to start with the best quality kale you can. The first step in doing that is to "eat fresh."

Curly leaves or smooth leaves, green leaves or red leaves, whether you're in the supermarket or farmer's market, look for kale with spry, bouncy leaves. Yes, I did just say "spry." I know it sounds strange, but you'll know what I mean when you see a bunch of kale. Avoid kale with any slimy spots or a yellow tinge (or bright yellowing of the leaves), or greens with dried-out stem ends. Further, you do not want wilted or dehydrated or shriveled-looking kale. Here's why:

Kale and other veggies wilt when they lose moisture. For those science aficionados out there, this happens because as moisture evaporates from the veggie, its cell walls lose rigidity. The vegetables become soft and flexible. As unappetizing as a wilted veggie is, there is an even bigger issue at hand. As moisture leaves the plant, it takes nutrients with it. Moisture loss not only reduces vitamin C and other levels, it also contributes to yellowing and bitterness. This means that the more flabby and dehydrated a kale leaf is, the less nutrients and taste it contains. And that's a problem.

KALE THEN AND NOW

The kale we grow today is almost identical to the kale that tribes foraged thousands of years ago. The prime difference is that now the leaves are bigger. The change in leaf size happened over many seasons as people who cultivated kale saved leaves from the plant that had the largest leaves. Meet the seed for next year's crop! Repeat this process over hundreds of years, maybe longer, and you will end up with large-leafed kale.

If you grow your own kale (see [Chapter 10](#) if you'd like to try this yourself), allow kale to stay in the garden until you plan to use it. Otherwise, place kale in the fridge as soon as you get it home. Several studies have shown that kale loses up to 89 percent of its vitamin C when left at 70°F (the typical temperature in a transport truck or even a vase of water on the kitchen counter, something many chefs unfortunately suggest) for two days after picking, compared to 5 percent for kale stored just above freezing for that same period.

As for washing beforehand, don't: Washing kale before storage encourages spoilage *and* it hastens nutrient loss. So wrap it or bag it and place it in the fridge. Although you can store kale for up to five days if it was super-fresh when purchased, I'd personally use it sooner. Not only will it lose important nutrients the longer it hangs out in your fridge, the more bitter its flavor will become. This is not a good thing for kids, or other veggiephobes. If you notice the leaves yellowing, toss it: Not only will the flavor be too strong, the nutrients will be almost nil.

Brassica oleracea is the Latin name for kale. *Brassica*, the genus name, meaning *cabbage family* and *oleracea*, the species name, meaning *without a head*. Soon, variations cropped up; some seeds sprouted into kale with large smooth leaves, or that bunched together or flowered at the top, or had engorged roots or swollen nodes at its base or stalk. Soon, people were saving seeds of these variants, which came to be known, respectively, as collards, cabbage, broccoli, rutabaga, turnip, kohlrabi, and Brussels' sprouts—all grandchildren of wild kale.

Another nutrient no-no: Pre-prepping your kale, then stashing it in the fridge until you have time to cook with it. Cooking magazines, mommy blogs, and television chefs champion the practice of prepping veggies in the fridge to encourage healthy nibbling and easier weeknight cooking. In theory, the idea is awesome: Open the fridge, grab whatever prepped bit of produce you need, and voilà! A healthy, convenient, economical snack. If, after you read what I have to say on the subject, you still want to pre-prepare your kale, go ahead. Eating pre-prepped kale is so much better than eating no kale at all! But do hear me out: Pre-cut fruits and veggies lose between 10 to 25 percent of their vitamin C and carotenoids. That's because oxygen destroys antioxidants. When kale (or any produce) is cut, the cut area is instantly exposed to oxygen, starting the breakdown of nutrients. Precooking kale (or other veggies and fruit) to use at a later time also saps nutrients.

So, how to store your kale so you get the most nutrient dense veggie possible? Again, don't wash it for starters! Remove any wilted or yellowed or spotty bits, then place your kale in a storage bag, firmly removing as much air from the bag as possible before tightly fastening shut. Store the bag in the vegetable crisper section of the refrigerator for no more than five days.

KALE BY ANY OTHER NAME...

Kale is often called “borecole” in some English-speaking countries. “Kale” is a Scottish word derived from *coles* or *caulis*, terms used by the Greeks and Romans in referring to the whole cabbage-like group of plants. The German word *kohl* has the same origin.

If you are nearing day four and you still haven’t used your kale, you are in the perfect place! Simply check out one of the recipes in this book and head to the kitchen!

DID YOU KNOW...?

You may hear kale being labeled as a member of the cruciferous family. What is this family and how is it different than the brassica family everyone lumps kale into? Well, actually they’re the same family. At one point, botanists referred to the group as *Cruciferous*, a Latin word meaning “cross-bearing.” This described the four petals of mustard flowers—one of kale’s cousins—which are reminiscent of a cross.

No time to cook? Go ahead and wash the kale, then de-rib it by folding the leaf together and pulling out the center rib. No need for a knife! This can be done entirely by hand. Next, place a large pot of water on the stove. When the water is boiling, blanch the de-ribbed kale by submerging it in the boiling water for two to three minutes. Immediately place the kale in a bowl or colander and run very cold water over it until the kale is cool to the touch. Tuck it into an airtight container and place in the fridge to use within two or three days or freeze it immediately for up to a month. You can defrost the kale and add it to soups, pasta, casseroles, and other dishes.

THE TALE OF TWO KALES

When you shop for kale, you will notice that the veggie sports various types of leaf shapes. That’s because there are two kinds of kale, *Brassica napus* and *Brassica oleraceae*. *Brassica napus* is the curly or ruffled-leaf kale, and includes the *Pabularia* group known as Siberian kale or red Russian kale.

Brassica oleraceae is the smoother-leaved family, including the *Acephala* group, which features collards and dinosaur kale. Dinosaur kale is a much more recent variety. It was discovered in Italy in the late 19th century.

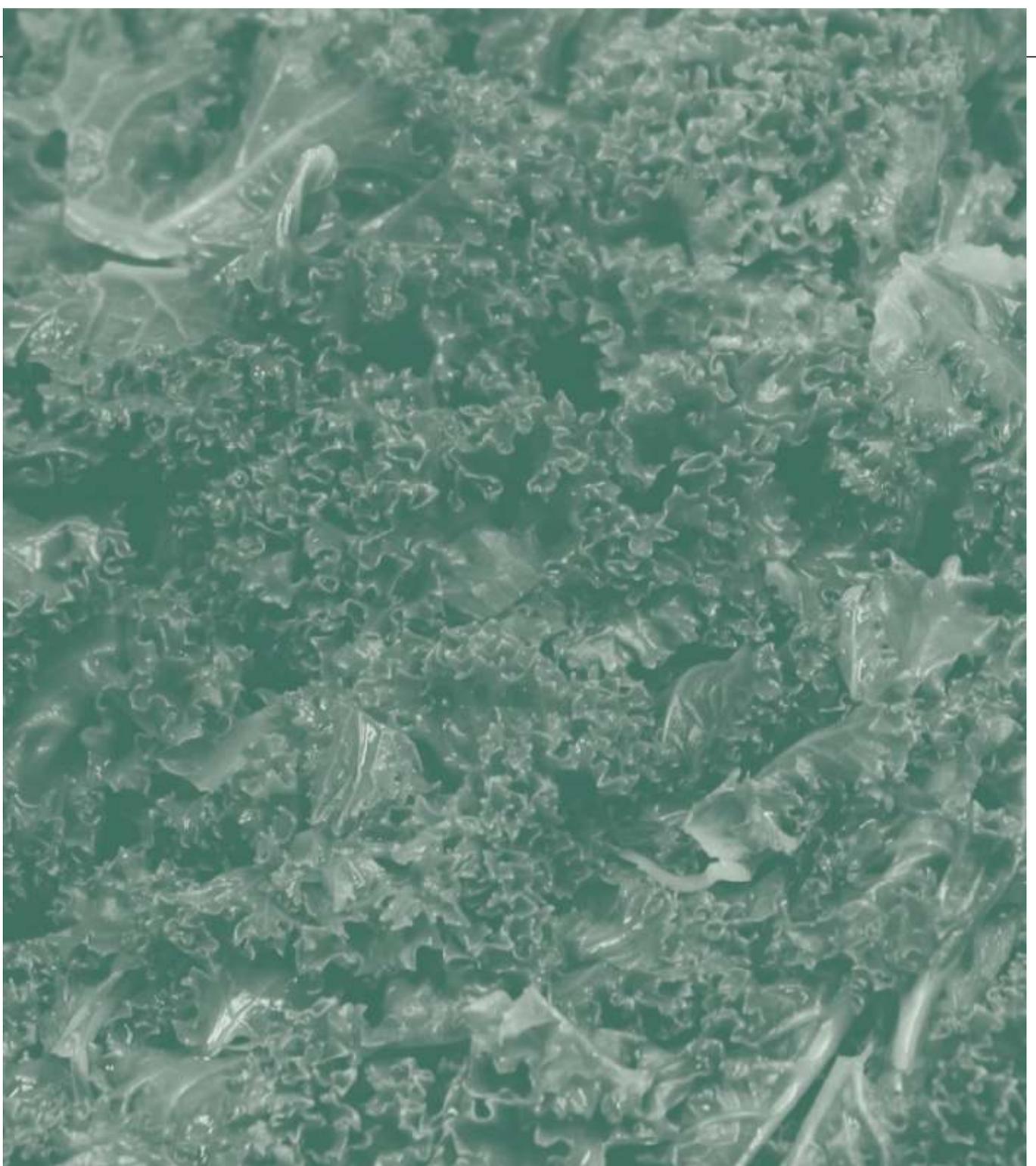


KALE'S ENORMOUS PLANT FAMILY

Kale is a member of the brassica family, an insanely diverse family with thousands of relatives. The *Cambridge World History of Food* cites 400 types of one relative, the cabbage, alone. It is estimated that there are more than 78,000 samples of the major brassicas and their wild relatives (inelegantly called “weeds”) in more than 130 countries throughout the world. Here is just a sampling of kale’s many cousins:

- Horseradish
- Land cress
- Ethiopian mustard
- Collard greens
- Chinese broccoli (Gai-Lan)
- Cabbage
- Brussels sprout
- Kohlrabi
- Broccoli
- Broccoflower
- Broccoli romanesco
- Cauliflower brassica
- Wild broccoli
- Bok choy
- Komatsuna
- Mizuna
- Rapini (Broccoli rabe)
- Flowering cabbage brassica
- Chinese cabbage (Napa cabbage)
- Turnip root / turnip greens
- Rutabaga
- Siberian kale
- Canola / rapeseed
- Wrapped heart mustard cabbage
- Mustard greens
- Mustard seed, brown
- Mustard seeds, white
- Mustard seeds, black
- Tatsoi

- Arugula / rocket / roquette
- Field pepperweed
- Maca
- Garden cress
- Watercress
- Radish
- Daikon
- Wasabi



KALE: THE NUTRIENT POWERHOUSE

Kale tastes great. It's versatile, straight-forward to cook, and easy to find. But it's kale's nutrient profile that makes it the darling of the healthy-living set. With dozens of vitamins and as many minerals, plus fiber, antioxidants, fatty acids, amino acids, and protein, kale is the veggie world's most-valuable-player.

For maximum health benefits, plan to eat kale at least three times a week (more often is even better!), enjoying anywhere from one cup to two cups at a time. Because different nutrients become available for the body to use in different concentrations when kale is eaten raw, lightly cooked or long-simmered, try to enjoy your greens in a variety of ways so that your body gets a hefty dose of everything.

For a deeper look at the nutrients kale offers—and what it can do for your health—keep reading. I think you'll be very impressed.

VITAMIN A

Kale is loaded with the plant-source form of vitamin A, called beta carotene (the form of vitamin A from animal-source food is called a retinoid). One cup of cooked kale contains an outrageous 17707.30 IU of vitamin A, which equals 354.1 percent of an adult's daily recommended allowance of the nutrient. This means enjoying kale a few times a week is a super way to ensure your body gets the vitamin A it needs.

Why this is important: Vitamin A has been shown to protect the body against cancer and it is a potent anti-inflammatory ingredient. It softens premature aging (including wrinkles, sun spots, and slack skin), wards off asthma, helps knock out pneumonia, and fights candida, heart disease, and inflammatory conditions such as arthritis and heart disease. It strengthens the immune system by helping the body fend off virus, bacterial attacks, and other illnesses. It improves photosensitivity and fertility, and fights macular degeneration. It even helps improve the bio-availability of iron and zinc in the body and prevent low birth-weight babies. How's that for a wide range of benefits?

VITAMIN A: WHAT HAPPENS WHEN THERE IS NOT ENOUGH

While most of us get plenty of vitamin A, deficiencies in this important vitamin are not uncommon. This is especially true for chronic dieters, those living on processed food, and individuals suffering from food scarcity. Here's what a lack of vitamin A can cause:

- Night blindness. This is one of the first signs of vitamin A deficiency
- Dry eyes, also known as Xerophthalmia
- Complete blindness
- Maternal mortality in pregnant women
- Miscarriage
- Inability to breast feed

- Increased risk of catching infection diseases
- Retarded or decreased childhood growth
- Slow bone development in children

VITAMIN B1

Vitamin B1, also known as thiamin, was the first of the B vitamins to be discovered. (The B vitamins—known collectively as B-complex vitamins—are a group of eight related water soluble nutrients.) Its discovery was a bit of an accident. Dutch doctor and medical researcher Christiaan Eijkman was studying beriberi patients in Jakarta when he realized that people who ate brown rice (which still has its bran coating intact) didn't get the disease. Upon closer study and after conducting several research trials, Eijkman was able to identify a nutrient contained in brown rice that he later named Vitamin B1. This substance seemed to protect people from beriberi.

The vitamin works wonders in maintaining nervous system and muscle health, as well as helping the body convert sugar to usable energy.

Brown rice, seeds, and legumes (such as lentils and beans) are terrific sources of vitamin B1. With each serving containing .07 mg of vitamin B1, 4.9 percent of an adult's daily recommended allowance, kale does not contain as much vitamin B1 as these sources, but it is a good, easy way to add thiamin to your daily diet.

STUTTERING BE GONE!

Did you know there are approximately 68 million people worldwide who stutter, most of them males? (Males are 4 times as likely to stutter as females.) Fortunately, there is help. One is vitamin B1, a vitamin also known as thiamine that is found in kale. Numerous studies have found the B1 vitamin helpful in lessening or even eradicating adult stuttering. One of the most recent, completed by the National Center for Stuttering in 2011, followed 38 male stutterers, ages 21 to 37, for two weeks. One group received 300 mg of vitamin B1 daily, while the other group received a placebo. The placebo group showed no improvement through the course of the trial, while in the vitamin B1 group, something curious happened: Everybody in the vitamin group showed some improvement and one-third of them were completely cured. Even after a seven-month follow-up, the stutter-free men still had not returned to stuttering.

VITAMIN B2

Known alternately as riboflavin and vitamin B2, this special nutrient plays several roles, including helping the body to maintain its supply of other B-complex vitamins, protecting the cells from oxygen damage and supporting cellular energy production. It also helps to prevent and treat anemia, carpal tunnel syndrome, cataracts, dry eyes, eye conditions including sensitivity to light and blurry vision, recurring headaches (including migraines), rosacea, and skin rashes.

Kale is a good source of this important vitamin. I've got to be completely honest: kale does not contain the extreme riboflavin levels that cremini mushrooms, spinach, and venison do, but one cup of our favorite brassica provides .09 mg, or 5.3 percent of an adult's daily recommended allowance for

vitamin B2. Kale is an easy, yummy way to get more of this essential B-complex vitamin into your diet.

VITAMIN B2: DID YOU KNOW...?

- Riboflavin has been shown to lessen the severity of and decrease the number of migraine headaches a person has.
- Drinking caffeinated beverages can deplete vitamin B2 (as well as other important nutrients such as magnesium and vitamins A, B1, B3, and B5).
- Ariboflavinosis is the official term for vitamin B2 deficiency.
- A deficiency of vitamin B2 can cause cracked skin in the corners of the mouth, chapped lips, and soreness and inflammation of the mouth and tongue.
- Vitamin B2 deficiency can lead to cataracts.
- Children who do not get enough vitamin B2 may experience retarded growth.
- Sugar depletes the body's store of vitamin B2, as well as all other B-complex vitamins.
- People who are often fatigued and lethargic are frequently also low in vitamin B2.
- Riboflavin helps the body metabolize iron, making the vitamin an important nutrient for those suffering from iron-deficiency anemia.
- Hypersensitivity to light can be a sign of a vitamin B2 deficiency.

VITAMIN B3

You may know vitamin B3 by its other name: Niacin. Like its B-complex cousins, niacin helps the body with energy production at a cellular level. It is also necessary to sustain healthy levels of cholesterol, stabilize blood sugar, help the body process fats, and help the cells create new DNA. That's a lot of important jobs for one nutrient! Don't get enough vitamin B3 and you may feel tired and lethargic—you may even experience muscle weakness, digestive upset, or skin rashes.

Kale contains moderate amounts of most B-complex vitamins, including vitamin B3. One cup of cooked kale contains .65 mg of niacin, which is 3.2 percent of an adult's daily recommended allowance. Every little bit counts!

VITAMIN B3: DID YOU KNOW...?

- Niacin was first discovered by chemist Hugo Weidel in 1873 in his studies of nicotine.
- Vitamin B3's original name, nicotinic acid, was changed to niacin (*nicotinic acid + vitamin*) to disassociate it from nicotine.
- Symptoms of vitamin B3 deficiency include: aggression, dermatitis, diarrhea, insomnia, intolerance of cold, mental confusion, and physical weakness. Late-stage conditions associated with vitamin B3 deficiency include pellagra.
- In the 1930s, vitamin B3 was also called Pellagra-Preventing Factor, as it was essential in preventing and curing pellagra.

- Foods rich in vitamin B3 include: brewer's yeast, broccoli, carrots, cheese, dandelion greens, dates, eggs, fish, kale, milk, peanuts, potatoes, tomatoes, tuna, veal, beef liver, and chicken breast.
- Niacin was named vitamin B3 because it was the third of the B vitamins to be discovered.
- Another name for vitamin B3 is vitamin PP.
- Vegemite, the Australian spread made of barley-based brewer's yeast extract, is one of the highest sources of niacin. A 5-gram serving contains 25 percent of an adult's daily recommended intake of the vitamin.

VITAMIN B6

When vitamin B6 was first discovered in 1934, it was called Antidermatitis Factor for its role in preventing and healing skin conditions, such as general inflammation, dermatitis, psoriasis, and eczema. It also helps the body heal cardiovascular disease, carpal tunnel syndrome, depression, and diabetic neuropathy—it has even been shown to improve autism and epilepsy conditions, as well as alleviate the effects of alcoholism, adrenal gland dysfunction, asthma, HIV/AIDS, kidney stones, PMS, and vaginitis. Vitamin B6 has also been used to reduce pregnancy-related nausea, prevent brain shrinkage in Alzheimer's patients, lower the risk of lung cancer, and even to help break up kidney stones. With all that, it's no wonder that vitamin B6 is the most thoroughly studied of the B-complex vitamins.

Luckily for you, every time you eat kale, you are getting a good amount of this wonder nutrient. One cup of cooked kale gives you .18 mg of B6, which equals 9 percent of an adult's daily recommended allowance. As if you needed another reason to eat kale!

SWEETER DREAMS WITH B6

A 2002 study at the City College of New York suggests that 250 mg of vitamin B6 a day increases one's dream vividness and the ability to recall dreams. The explanation for this phenomena is that vitamin B6 increases sleeptime arousal during periods of rapid eye movement (REM) sleep.

WHAT ARE OXALATES AND WHY ARE THEY IN KALE?

As much good stuff as kale has, it also contains something that a few people may want to watch out for: Oxalates. These naturally-occurring molecules are organic acids, and they are made by most all living things, plant and animal. Humans regularly convert substances, such as vitamin C, to oxalates. For most people, oxalates are a neutral substance that doesn't affect health. But for others, oxalates can become a problem if there are too many of them in the body. Excess oxalates can crystallize in the gallbladder or kidneys, leading to gallstones or kidney stones. To stay on the safe side, restrict your consumption of high-oxalate foods, such as spinach, and aim for no more than one to two servings of cooked or raw kale per week.

VITAMIN B9

If you are a woman of childbearing age, have been a woman of childbearing age, or know a woman of childbearing age, you may know vitamin B9 by its other names: Folate, or folic acid. This is the nutrient obstetricians and midwives urge their patients to take starting the moment they are considering having a baby.

Here's why: Folate gets a lot of attention for helping to prevent birth defects, specifically those involving the neural tube (the body part that later forms the brain and spinal column) and the cleft palate. It has also been found to reduce the risk of nervous system disorders in infants, help ward off Alzheimer's disease and dementia, prevent osteoporosis, and lower the risk of cancers of the esophagus and lung, uterus, cervix, and intestine. Folate also keeps skin dermatitis-free.

Vitamin B9 is another B-complex vitamin that is available in moderate amounts in kale. One cup of the cooked greens contains 16.90 mcg, or 3.6 percent of an adult's daily allowance for the nutrient.

THE HIGH COST OF FOLIC ACID DEFICIENCY

Every year, about 3,000 babies in the United States are born with spina bifida or anencephaly. These neural tube defects are caused by the incomplete closing of the fetus's spine and skull during pregnancy. The total lifetime cost of care for a child born with spina bifida is estimated to be \$560,000. The annual medical care and surgical costs for people with spina bifida exceed \$200 million. These expenditures are nothing compared to the emotional heartache connected with the condition. What's especially sad is 50 to 70 percent of these neural tube defects could be prevented if women took just 400 mcg of folic acid daily, before and during pregnancy.



VITAMIN C

Vitamin C was the first-discovered—and remains one of the best known—of antioxidant vitamins, meaning it fights oxidation in the body. You probably already know what oxidation is: Think of a cut apple. What happens when its flesh is exposed to air; It gets brown, right? That's oxidation. A small bit of oxidation happens naturally in the body during regular cell function. But unsafe levels of oxidation can occur when you are exposed to steady amounts of pollution, chemicals, processed food, excess sugar, alcohol, cigarette smoke, and even stress. The result is cell damage and even death. Oxidation makes our skin look older, our immunity weaker, and our bodies more prone to fatigue and illness.

Vitamin C, also known as ascorbic acid, can help the body ward off oxidation by a complex chemical reaction that kills oxidized cells. It also helps with wound healing, maintains healthy tissue (from skin tissue to gum tissue to the tissue that makes up our blood vessels), and boosts the immune system. Fortunately, kale is packed with this hardworking nutrient. One cup of our favorite veggie

packs 53.30 mg of the vitamin, providing 88.8 percent of an adult's recommended daily allowance.

VITAMIN C: DID YOU KNOW...?

Consistent exposure to hot temperatures and air pollution, eating a diet heavy in processed foods, regular use of aspirin, and smoking all increase one's need for vitamin C.

VITAMIN E

Vitamin E, known in nutritionist circles as tocopherol, is a powerful antioxidant. Actually, it's a powerful *family* of antioxidants—vitamin E is a generic term for a cluster of eight structurally similar, related molecules that work together to protect the body from oxidative stress, strengthen the immune system, and protect the nervous and cardiovascular systems.

A 1-cup serving of kale can give you 1.11 mg of vitamin E. That's 5.6 percent of an adult's recommended daily allowance. True, that's not a huge amount, but it is a respectable quantity, in a delicious, easily digestible form. And because vitamin E is fat soluble—meaning that it is stored in your body's fat tissue until needed—most people don't need as much vitamin E as they would a water-soluble vitamin in which any extra amount is immediately excreted from the system.

THE DISCOVERY OF E

In 1922, University of California researchers Herbert Evans and Katherine Bishop discovered vitamin E in green leafy vegetables. Due to its role in helping infertile laboratory rats reproduce, it was first known as "factor X" and the "anti-sterility factor". Evans later suggested its current name, vitamin E, so named because it was the next vitamin to be discovered after vitamin D.

VITAMIN K

There are many people in the world who have never heard of vitamin K. Identified in 1929 by Danish scientist Henrik Dam, the nutrient was named vitamin K after its discovery was mentioned in a German medical journal, which referred to it as *Koagulationsvitamin*.

Vitamin K is perhaps best known for its role in helping blood to clot normally. Many people who are deficient in the vitamin notice that they bruise easily, or experience heavy nose bleeding, excessive bleeding from everyday cuts, overly-heavy menstrual bleeding, and even rectal bleeding. But the nutrient also assists with strengthening healthy bones, helping to protect against bone loss and fractures.

Kale is one of the richest dietary sources of vitamin K around—just one cup of the greens contains 1,062.10 mcg of the vitamin, or 1,327.6 percent of an adult's recommended daily allowance of vitamin K.

VITAMIN K'S BLOOD CLOTTING CONSIDERATION

Vitamin K is essential for helping blood clot quickly and easily in the presence of a wound. But for

the thousands of individuals who suffer from cardiovascular conditions and are currently on blood-thinning medication, the natural clotting attributes of vitamin K can be a problem. If you are one of these people, discuss your diet with your health provider before starting to take more vitamin K. Usually, individuals on blood thinners can safely eat kale three or four times a week, whereas vitamin K supplements are strictly off-limits. But as always, discuss with your doctor before you make any changes in your diet or supplement schedule.

CAROTENOIDS

Carotenoids are chemicals that exist in plant and animal pigments. In other words, they help give living things their color. While science is still studying carotenoids, as of now 600 different carotenoids have been identified including, beta-carotene, alpha-carotene, gamma-carotene, lycopene, lutein, beta-cryptoxanthin, zeaxanthin, and astaxanthin. Carotenoids happen to be powerful antioxidants that protect and strengthen human cells—each carotenoid provides slightly different benefits but overall, they work to increase immune system function and fight off the damages of free radicals in the body.

Long-term low intake of carotenoids—which is not uncommon among people who don't eat several servings of veggies a day—can make you susceptible to infertility, lowered immunity against infectious diseases, and an increased risk of cardiovascular diseases and cancers. It can also diminish the quality of your skin, hair, and nails.

No current recommended dietary intake levels have been established for carotenoids. However, in order to get adequate carotenoid levels, the United States National Academy of Sciences recommends that individuals consume five or more servings of fruits and vegetable (such as kale!) every day.

KALE KEEPS EYES YOUNG

Age-related macular degeneration (known as ARMD) is the world's leading cause of blindness for people 65 and older. It occurs when cells (called macular cells) in the center of the eye's retina begin to deteriorate. Fortunately, kale can help prevent ARMD, as well as slow its progress. The specific nutrients in kale responsible for this feat? Two carotenoids called lutein and zeaxanthin.

As antioxidants, lutein and zeaxanthin help in three ways: By defending the retina against cell-damaging free radicals, by maintaining blood vessels in the macula (so oxygen and other nutrients can thus ensuring a constant supply of healing oxygen and nutrients), and by filtering out UV light which has been found to be damaging to eyesight.

Consider recent evidence: Two separate studies show that eating foods rich in lutein can increase macular pigment. In 1995, The Eye Disease Case-Control Study, conducted at the Massachusetts Eye and Ear Infirmary in Boston, found that individuals with the highest blood levels of lutein and zeaxanthin were 70 percent less likely to develop ARMD than those with the lowest levels. The study also found that people who ate lutein- and zeaxanthin-rich greens (such as kale and spinach) five or more times a week (averaging 6 mg of lutein a day) were 43 percent less likely to suffer from ARMD than those who consumed the greens less than once a month. Moreover, the Harvard Nurses' Health Study, in which nurses (71,494 women and 41,564 men ages 50 years and older) were followed for 18 years through the 1980s and into the '90s, found that eating spinach more than five days a week lowered ARMD risk by 47 percent.



FLAVONOIDS

Flavonoids are plant-based pigments that boast powerful antioxidant benefits. Over 4,000 have been identified and it is believed there may ultimately be between 5,000 to 10,000 flavonoids in existence. Like carotenoids, flavonoids help protect the body's cells from degeneration and damage. In a 2011 research study in the Netherlands, it was found that individuals with the greatest flavonoid intake (30 to 50 mg) had a 20 percent lower risk of stroke than those in the study who had the lowest flavonoid intake. While no dietary recommendations have been set for flavonoids, and few foods have been measured for exact flavonoid amounts, you can easily get 30 to 50 mg of flavonoids in your diet by eating between three to five servings of veggies a day, including kale, which is rich in the nutrient.

FINDING FLAVONOIDS

Originally known only for their roles as plant pigments, no one realized that flavonoids were beneficial until 1938 when a Hungarian scientist named Albert Szent-Gyorgyi—the same researcher who won a Nobel Prize in 1936 for isolating and identifying vitamin C—realized that flavonoids did so much more than create pretty colors.

GLUCOSINOLATES

Glucosinolates are phytonutrients. More precisely, they are sulfur-containing compounds that have been shown to have a powerful effect on cancer—both lowering your risk and helping cancer patients beat their illnesses. Glucosinolates also have strong detoxifying effects, helping the body rid itself of potentially dangerous toxins, which can contribute to a number of diseases and brain differences. Lastly, glucosinolates have been shown to have anti-inflammatory abilities, helping the body reduce the cellular inflammation that is tied to a range of illnesses, from heart disease to rheumatoid arthritis.

There is no current recommended daily allowance of glucosinolate, but kale is rich in the nutrient. Eating three or more servings of kale per week is all you need to get the glucosinolate that can help you stay your healthiest.

TOO STINKY FOR BUGS

We humans consider them cancer-fighters, but kale and other brassica-family plants manufacture

strong-smelling glucosinolate to repel bugs.

FIBER

Fiber gives structure to food. In animal protein, it is typically the muscle fiber. In plant food, such as kale, it provides the tell-tale shape of the leaf (or stalk, root, tuber, bulb, flower, pod, or seed). There are a few reasons why fiber is a good thing for humans to eat: First, fiber binds to things—bad things—and helps escort them from the body. Cholesterol is one of these things. Fiber surrounds cholesterol in the blood, basically absorbing it, so it never has to be sent to the liver to be broken down. This helps lower blood cholesterol levels and the amount of cholesterol in the liver.

Secondly—and you probably already know about this one—fiber helps promote bowel regularity. Yep, it helps make digestion easier, by surrounding waste in the large intestine and helping carry it out of the body. This prevents constipation and lessens the time intestinal tissue is in contact with waste that may contain carcinogens, thus lessening one's risk of cancer. Another digestive benefit of fiber: Fiber feeds the “friendly” flora in the large intestine, helping keep flora populations strong and healthy so they can break down any poorly digested food that makes its way into the colon.

THE TWO TYPES OF FIBER

Fiber is what gives food structure. It comes in two varieties, insoluble and soluble. Insoluble fiber is the type found in kale and brassica-family veggies, does not change, break down or dissolve in the presence of liquids. Soluble fiber (which I call “swellable fiber”) is found in things like oats. It softens and swells when it gets wet. You need both for good health.

Fiber also helps keep blood sugar levels low, which is important for diabetics, people with hypoglycemia, and anyone who suffers from food cravings. Fiber does this by slowing the rate at which food (and blood sugar) leaves the stomach after eating. Why this is good: It means a big rush of blood sugar isn't dumped into the blood all at once, which in turn creates dangerous spikes in blood sugar, weakness, moodiness, irritability, and cravings.

Those trying to lose weight find diminished cravings helpful in warding off overeating. Plus, fiber creates a feeling of supreme satiety in the stomach, making you feel so full that you don't want to put any more food in your system. Voila! Less calories!

Kale contains a good amount of fiber. A 1-cup serving of the cooked green provides 2.60 grams or 10.4 percent of an adult's daily recommended allowance of fiber.

INDIGESTION AID?

It is said that Julius Caesar ate a generous serving of collards as an indigestion preventive after attending royal banquets—a testimony to the green's detoxifying properties! Does this make collards nature's all-natural antacid?

OMEGA-3 FATTY ACIDS

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