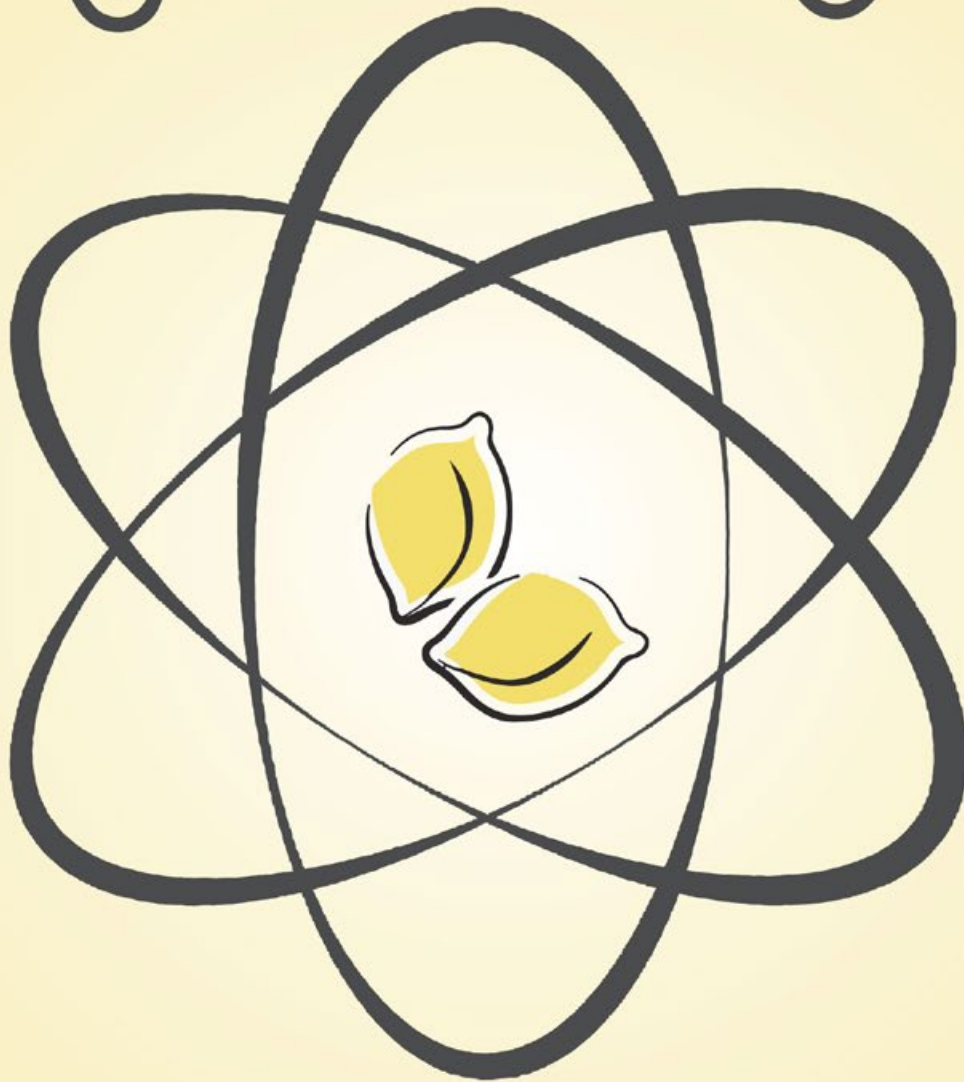


**Nutrivore**

GUIDE TO



**Citrus**

BY THE TEAM AT NUTRIVORE

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# Introduction to Citrus

A juicy orange, a tart grapefruit, a sweet tangerine... the citrus family provides us with some of our most well-loved fruits! In fact, citrus has been present in the human diet since ancient times, originally domesticated by indigenous cultures throughout tropical and subtropical regions of Asia and the Malay Archipelago. From the years 3000 to 1500 BCE, citrus were among the canoe plants carried by voyagers from Austronesia to Micronesia and Polynesia. And by the year 310 BC, the very first citrus fruit—the citron—reached Europe, where it spent hundreds of years being the only citrus known there!

Today, citrus is one of the world's most important fruit crops, grown in over 140 different countries across the globe. Oranges lead in popularity (they account for over half of the world's citrus production!), but tangerines, lemons, and grapefruits are also widely grown and enjoyed.

Although many of us consume citrus for their delicious taste, they also happen to be incredibly health promoting. Let's take a tour of this juicy food group!



# What Are Citrus Fruits?

Citrus fruits come from plants of the citrus genus, a group of flowering shrubs and trees in the rue family (AKA Rutaceae). Botanically speaking, citrus fruits are actually a special type of berry called a hesperidium—characterized by a tough outer rind, a segmented interior, juicy pulp, and enclosed seeds.

Some of the most common citrus fruits today include:

- BERGAMOT
- BLOOD ORANGE
- BUDDHA'S HAND
- CITRON
- CLEMENTINE
- FINGER LIME
- GRAPEFRUIT
- KAFFIR LIME
- KEY LIME
- KUMQUAT
- LEMON
- LIME
- MANDARIN
- MEYER LEMON
- ORANGE
- POMELO
- SATSUMA
- TANGELO
- TANGERINE
- YUZU

In all, there are more than 2,500 types of citrus fruits (and more than 600 types of oranges alone!). Many of these fruits aren't separate species, but hybrids of other existing citrus fruits. For example, grapefruits are actually a hybrid of the pomelo and sweet orange, and tangelos are a hybrid of either mandarin oranges or tangerines and grapefruit!

# What Makes Citrus So Great?

Citrus contains an outstanding combination of phytonutrients, micronutrients, and fiber. Here's the lowdown!

## Phenomenal Phytonutrients

Citrus fruits are bursting with phytonutrients—particularly a unique class of flavonoids known as **flavanones**. Flavanones are universally present in citrus fruits, and are responsible for not only their distinctive bitter taste, but also many of their health benefits.

On the whole, flavanones have impressive free radical-scavenging activity, with evidence suggesting they can help protect against various chronic diseases (including cardiovascular disease and cancer), lower blood lipids, improve insulin sensitivity, reduce hypertension, lower inflammation, and exert antioxidant activity. In the gut, flavanones interact with and influence the microbiota, and these interactions may be responsible for many of these phytonutrients' biological effects! Some flavanones also appear to traverse the blood-brain barrier, giving them potential roles in protecting against neurodegenerative diseases.

Some of the specific flavanones in citrus fruits include:

- **HESPERIDIN**, one of the most abundant flavanones in citrus (found in particularly high concentrations in the fruit peels and membranes). Hesperidin has potent antioxidant, anti-inflammatory, anti-diabetic, anti-cancer, neuroprotective, and cardioprotective properties, and may help improve blood vessel function! It's also a boon for gut health, helping increase populations of probiotic bacteria like *Bifidobacterium bifidum* and *Bifidobacterium adolescentis*. Hesperidin acts as an antioxidant not only through radical scavenging, but also due to enhancing cellular antioxidant defenses, and has been shown to protect against oxidative stress from high fat diet-induced high blood sugar.
- **HESPERITIN**, the aglycone of hesperidin. It has significant anti-inflammatory, anti-cancer, and lipid-lowering abilities (reducing both cholesterol and triglycerides), with a notable ability to reduce secretion of apoB (the main protein found in low-density lipoproteins).
- **NARINGIN**, predominantly found in grapefruits, and to a lesser extent in oranges and lemons. Naringin gives a bitter taste to citrus fruits, and has been studied for its potential antioxidant and





anti-inflammatory properties. Studies of naringin have shown its antioxidant effect is due to reducing reactive oxygen species and increasing antioxidant defenses, including catalase, glutathione peroxidase, and superoxide dismutase. It may likewise enhance ethanol metabolism, increase bone cell activity, stimulate DNA repair in prostate cancer cells, act as an anti-apoptotic agent, and stimulate the growth of beneficial microbes (such as bifidobacteria) in the gut—in turn increasing the generation of SCFAs. It's also known for its ability to affect the absorption of certain drugs in the digestive system!



- **NARINGENIN**, the aglycone of naringin. Naringenin has lipid-lowering, anti-obesity, anti-diabetic, and liver-protective properties, including combatting fatty liver disease. It's also been shown to inhibit the growth of some pathogens (such as *E. coli*, *Staphylococcus aureus*, and *Salmonella typhimurium*).
- **NEOHESPERIDIN**, a bitter-tasting flavanone particularly abundant in Seville oranges. It's been shown to alter the gut microbiota in a way that helps prevent colorectal tumors and potentially even protect against obesity!
- **ERIODICTYOL** and its glycoside **ERIOCTRIN**, found in limes and lemons. These flavanones have neuroprotective, anti-cancer, vascular protective, kidney protective, liver protective, lipid-lowering, and immune-modulating effects, with an ability to inhibit inflammation and oxidative stress. They're particularly promising in the prevention and treatment of diabetes, due to improving insulin production and subsequently enhancing glucose uptake!
- **NARIRUTIN**, found in oranges, limes, lemons, mandarins, grapefruit, and satsumas. Along with possessing anti-inflammatory and antioxidant properties, it's demonstrated wide-ranging health effects including neuroprotection, liver protection, anticancer activity, anti-allergic activity, anti-diabetic activity, anti-obesity action, and immunomodulation.
- **PONCIRIN**, a bitter-tasting flavanone glycoside particularly abundant in mandarin oranges. It has anti-inflammatory activity (through inhibiting the production of PGE2 and IL-6), and may help protect against bacterial and viral infections, bone loss, liver injury, gastritis, some cancers, and even Alzheimer's disease.

But, the list of citrus phytonutrients doesn't end there! These fruits are also rich in **limonoids**, a type of triterpenoid that's been the subject of numerous studies (with promising findings as far as human health is concerned). Citrus limonoids such as **limonin**, **obacunone**, **deacetylномilin**, and **nomilin** have been

shown to exert anti-cancer, antimicrobial, anti-diabetic, and antioxidant activities, all of which contribute to the protective effects that show up in observational studies of citrus consumption. These phytonutrients demonstrate antiproliferative activity against human cancer cells (including liver cancer, meningioma, leukemia, lymphoma, pancreatic cancer, breast cancer, and colon cancer cells), and some research has shown that limonoids combined with curcumin from turmeric have an additive effect that makes this duo particularly powerful in fighting colon cancer.

On top of that, citrus limonoids can modulate inflammatory pathways, and some limonoids have been shown to decrease circulating biomarkers of chronic inflammatory conditions (such as cardiovascular disease, diabetes, cancer, and nonalcoholic fatty liver disease).

Citrus are also great sources of **carotenoids**—plant pigments responsible for these fruits' lovely orange, yellow, or pinkish colors! About 115 different carotenoids have been identified in various citrus species, including alpha- and beta-carotene, lycopene, beta-cryptoxanthin, lutein, zeaxanthin, and violaxanthin. In general, carotenoids increase resistance to oxidative stress, reduce inflammation, and have been shown to support vision health (particularly age-related eye diseases like macular degeneration and cataracts). Research shows a high intake of carotenoids could even protect against metabolic syndrome and diabetes!

Some citrus fruits, particularly blood oranges, are also great sources of **anthocyanins**—plant pigments that possess significant antioxidant activity. Along with their ability to capture free radicals, anthocyanins have cardioprotective, neuroprotective, anti-inflammatory, blood-sugar-lowering, and anti-cancer properties. Studies suggest they could help protect against heart disease and diabetes, and may even help reduce the perception of pain!

Some other amazing phytonutrients in citrus include:

- **DIDYMIN**, a flavonoid found in a variety of citrus fruits (like oranges, lemons, mandarins, grapefruit, lemons, and bergamot). It has antioxidant, neuroprotective, liver-protective, anti-inflammatory, cardioprotective, and anti-cancer activity against several different cancer cell types (including lung and neuroblastoma). It also has promising anti-diabetic potential!
- **NOBILETIN**, a flavone found in mandarin oranges, tangerines, grapefruit, and oranges. It has anti-inflammatory, antioxidant, lipid-lowering, cardioprotective, and neuroprotective activity, with in vitro and animal studies suggesting it could suppress bone loss and improve insulin sensitivity. It's shown particular promise for improving cognitive deficits and pathological features in Alzheimer's and Parkinson's disease.
- **QUERCETIN**, a flavonoid that's been shown to suppress inflammation in the brain and promote a healthy gut barrier.
- **LUTEOLIN**, a flavonoid that's strongly neuro-protective with anti-cancer activity, along with being able to reduce inflammation, regulate the immune system, reduce allergic responses, prevent toxicity associated with chemotherapy and radiation, and reduce pain.

And when it comes to different types of citrus? The more, the merrier! Although they share plenty of things in common, citrus fruits all have unique phytonutrient profiles, with some bioactive compounds being specific to certain fruits. For example, hesperidin and narirutin are the dominant flavanones in sweet oranges and mandarins, while neohesperidin is more dominant in sour oranges. Pummelos and grapefruit contain an abundance of naringin, while lemons are rich in eriocitrin. More brightly colored citrus (like Cara Cara oranges) tend to be higher in carotenoids. So, the greater variety of citrus we eat, the broader the spectrum of phytonutrients we obtain!

## Magnificent Micronutrients

As far as micronutrients go, citrus are superstars in a few key areas. Most famously is their high content of **VITAMIN C**—a water-soluble vitamin with powerful antioxidant properties, with important roles in the immune system and collagen production.

In fact, the vitamin C content of citrus helped form one of the first controlled clinical trials recorded in medicine, centuries before vitamin C was even discovered. In 1747, while on board the HMS Salisbury, a physician named James Lind treated men suffering from scurvy (a disease of vitamin C deficiency) with various remedies including cider, sea-water, vinegar, vitriol, garlic paste and citrus fruit (two oranges and one lemon daily). By the end of the week, sailors receiving citrus fruit felt well enough to help their counterparts, who were not so lucky!

Even though vitamin C was not yet known at that time, these results helped address this serious illness and protect sailors from potentially deadly deficiency. In fact, the Royal Navy made sure all sailors had lemon juice to drink when they were at sea for voyages longer than one month. And as homage to Lind's contributions, to this day a lemon tree adorns the official crest of the British Institute of Naval Medicine!

Along with vitamin C, citrus offers notable amounts of some other vitamins and minerals, including:

- **COPPER**, a trace mineral involved in glucose and cholesterol metabolism, gene expression, free radical scavenging, red blood cell production, and the growth, development, and maintenance of various organs (including the heart and brain). Kumquats offer over 10% DV of copper, and limes also offer a notable 7% DV per serving.
- **FOLATE**, an essential B vitamin that plays roles in blood cell production, the formation of genetic material (including DNA), cell growth, cardiovascular health, cancer protection, and cognitive and neurological health. California Valencia oranges provide nearly 10% DV of folate, while navel oranges are a close second at almost 8% DV per serving.
- **POTASSIUM**, an electrolyte mineral with roles in a wide variety of life-sustaining processes such as heart function, muscle contraction, nerve impulse transmission, blood pressure control, blood pH, and fluid balance. There is a swath of citrus fruits that are all neck-in-neck for potassium providing around 5% DV per serving: tangerines, clementines, oranges and kumquats.
- **VITAMIN B5 (PANTOTHENIC ACID)**, a water-soluble B vitamin that serves as a cofactor for coenzyme A—which in turn is critical for metabolizing many drugs and toxins and synthesizing



cholesterol, fatty acids, melatonin, the neurotransmitter acetylcholine, steroid hormones, heme, and vitamins A and D. The fruits that offer around 4-5% DV of this vitamin are oranges, grapefruit and tangerine.

- **VITAMIN B6 (PYRIDOXINE)**, a group of six water-soluble compounds required by over 100 different enzymes to carry out functions in protein metabolism, fatty acid metabolism, neurotransmitter production, gluconeogenesis, hemoglobin synthesis, the release of glucose from glycogen, and energy metabolism (particularly the production of ATP in the Krebs cycle). Oranges, tangerines and lemons all provide a noteworthy 4-6% of this vitamin per serving.
- **VITAMIN B7 (BIOTIN)**, a water-soluble B vitamin that plays an important role in energy metabolism (serving as a coenzyme for five carboxylase enzymes), neurotransmitter production, cellular function, and the function of various organs. Oranges are the standout biotin source at over 7% of this nutrient per serving.

## Fabulous Fiber

The fiber in citrus is another major driver of this food group's health benefits! Most citrus fruits are rich in the fibers pectin, cellulose, lignin, and hemicellulose, which have benefits ranging from improved digestion to cholesterol reduction (and in some cases, serve as fermentable prebiotics for our gut bacteria).

Citrus pectin, in particular, has exciting potential for our health. Pectin is soluble in water and is highly fermentable (meaning very little passes through to the colon, since it's so readily fermented by bacteria in the small intestine). Pectins are rich in galacturonic acid and can be found in several types of configurations (further subdividing this class of fibers by structure). Some research indicates that citrus pectin can support weight loss, and this fiber has been shown to inhibit the binding of fibroblast growth factor (FGF) with the FGF receptor—in turn potentially affecting cholesterol metabolism. In vitro studies have shown that pectins may have a role in cancer protection and treatment due to their ability to reduce metastasis, angiogenesis, and solid tumor growth.

When it comes to supporting our gut health, citrus is a particularly worthy addition to our diet. Pectin from lemon has been shown to stimulate the bacteria Ruminococcaceae and Succinivibrionaceae, which in turn produce butyrate that our intestinal cells use for fuel (and which exert important anti-cancer effects). The citrus phytochemicals naringin and hesperidin appear to stimulate short-chain fatty acid production and enhance the growth of *Bifidobacterium bifidum*, *Bifidobacterium adolescentis*, and the *Clostridium coccooides*/*Eubacterium rectale* cluster.

Per 100g of raw citrus fruit, the fiber contents of some of the most popular varieties are:

- **CLEMENTINES**: 1.7g
- **GRAPEFRUIT**: 1.6g
- **KUMQUATS**: 6.5g
- **LEMONS**: 2.8g

- LIMES: 2.8g
- ORANGE, CALIFORNIA VALENCIA: 2.5g
- ORANGES, FLORIDA: 2.4g
- ORANGES, NAVEL: 2.2g
- TANGERINES: 1.8g

# Health Benefits of Citrus Fruits

Regular consumption of citrus fruits has been linked to wide-ranging protection against disease—including cardiovascular disease, neurological conditions, cancer, endometriosis, and obesity! Here's the full scoop.

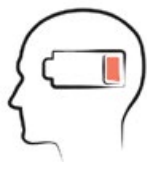


## Reduced risk of cardiovascular disease:

Research consistently shows citrus fruits to be powerfully cardioprotective. For example, [a 2011 cohort study](#) of over 10,600 Japanese adults with no history of cardiovascular disease found that compared to infrequent intake of citrus fruits, consuming citrus near-daily was associated with a 43% lower risk of cardiovascular disease in men and 49% lower risk in women.

Similarly, [a 2017 systematic review and meta-analysis of 95 studies](#) found that high versus low citrus consumption is significantly associated with lower risk of cardiovascular disease and mortality, including:

- 9% lower risk of coronary heart disease
- 26% lower risk of total stroke (as well as a 12% lower risk with every 100 g of citrus consumed daily)
- 22% lower risk of ischemic stroke
- 26% lower risk of hemorrhagic stroke
- 22% lower risk of cardiovascular disease (as well as an 8% lower risk with every 100 g of citrus consumed daily)



## Reduced risk of depression:

Likely owing to some of its neuroprotective and neuro-modulating phytonutrients, citrus could help protect against some mood disorders like depression. [A 2016 prospective cohort study](#), following more than 82,000 women over a 10-year period, found a significant protective effect of citrus consumption on this condition: participants who consumed at least two servings of citrus fruit or citrus juice per day had a 18% lower risk of depression, compared to those consuming less than one serving per week!



## Reduced risk of dementia:

Citrus may offer cognitive benefits beyond just mood. In [a 2017 cohort study](#), encompassing over 13,000 elderly Japanese participants, frequent citrus consumption was associated with a lower risk of developing dementia over the course of 5.7 years. After controlling for other variables, consuming citrus 3 – 4 times per week was associated with a 18% lower risk of dementia, compared to con-

suming citrus twice or fewer times per week; for those consuming citrus almost every day, the risk reduction was 23%! [A 2020 case-control study](#) similarly found a protective effect of citrus consumption on early onset dementia.



## Reduced risk of cancer:

A large body of research has been conducted on citrus intake and cancer risk, with evidence pointing to a protective effect for many different cancer types!

For example, [a 2021 meta-analysis](#) of 21 observational studies found that people with the highest versus lowest intake of citrus fruit had a 9% lower risk of **lung cancer**. A dose-response analysis of the data found that maximum risk reduction occurred with 60 g of citrus per day.

[A 2023 meta-analysis](#), encompassing eight observational studies, found that high citrus fruit consumption was associated with a 16% lower risk of **renal cell carcinoma** (a type of kidney cancer), with every 100 g increase in citrus intake correlating with a 13% reduction in risk.

Similarly, some evidence suggests a protective effect of citrus on **breast cancer**. [A quantitative systematic review](#) from 2014 found that high (versus low) intake of citrus fruits was associated with a 10% lower risk of this disease!

[A 2009 systematic review](#) found that higher citrus intake was associated with a 17% lower risk of **pancreatic cancer**—although due to weak study designs, more research is needed here to confirm this relationship.

Citrus may be particularly helpful in preventing digestive system cancers. [A 2016 meta-analysis](#) of cohort studies found that citrus intake was strongly inhibitive of **stomach cancer**—particularly a subtype of stomach cancer that occurs near the top of the stomach near the esophagus, known as cardia gastric cancer. For this type of stomach cancer, consuming 100 g of citrus per day was associated with a 40% lower risk! [A 2019 analysis of 15 case-control studies](#) similarly found that compared to the lowest third of citrus intake, higher citrus consumption was associated with a 20% reduction in stomach cancer risk. The protective effects of citrus reached their maximum at three servings per week.

And, a [massive 2023 meta-analysis](#), encompassing 24 studies and over one million participants, found that higher intake of citrus fruit was associated with a 9% lower risk of **colorectal cancer**. A dose-response analysis further found that maximum protection (15% lower risk) occurred with 120 g of citrus per day.

Citrus could even benefit **bladder cancer**! [A 2014 meta-analysis](#) of observational studies found a 15% reduction in bladder cancer risk for high versus low intake of citrus. When limited to case-control studies, the risk reduction was an even higher 23%.

Similarly, citrus fruit appears protective against several different head and neck cancers. [A 2019 meta-analysis](#) found citrus consumption to be significantly protective against **nasopharyngeal cancer**, with higher intakes associated with a 28% lower risk. Analyzed a different way, the data showed that consuming citrus four times per week was associated with a 21% reduction in cancer risk!

[A 2016 literature review](#) determined that every 100 g increase in citrus fruit consumption was associated with a 14% lower risk of **esophageal cancer**. These findings were consistent with [a 2015 meta-analysis](#), which found that higher citrus intake was associated with a 27% reduction in esophageal cancer risk, as well as [a 2018 meta-analysis](#), which showed citrus is particularly protective against a subtype of esophageal cancer known as esophageal squamous cell carcinoma (a 51% lower risk of this cancer for high versus low citrus intake!).

And, [a 2018 meta-analysis](#) found that citrus had an impressive protective effect against oral cancer: people with the highest citrus intake (versus the lowest intake) had a staggering 50% lower risk of both **oral cavity cancer** and **pharyngeal cancer**!



### Improved body weight regulation:

[A 2020 systematic review and meta-analysis](#) of 13 randomized clinical trials found that citrus consumption (and/or supplementation with citrus extracts) led to significant decreases in body weight, BMI, waist circumference, and hip circumference.



### Lower risk of endometriosis:

Some evidence suggests citrus may be protective against endometriosis—a painful condition that occurs when endometrial tissue grows outside the uterus. In a [2018 analysis of case-control studies](#), citrus fruit consumption had a particularly strong inverse relationship with endometriosis: women consuming at least one serving of citrus fruit daily had a 22% lower endometriosis risk, compared to those consuming less than one serving per week!



### Lower risk of all-cause mortality:

[A 2017 systematic review and meta-analysis of 95 studies](#) found that high versus low citrus consumption was associated with a 10% lower risk of death from all causes!



# Citrus Nutrivore Scores

Citrus fruits have an average Nutrivore Score of 391.

<b>Clementines</b>	291
<b>Grapefruit, pink and red</b>	361
<b>Grapefruit, white</b>	315
<b>Kumquats</b>	381
<b>Lemon</b>	477
<b>Lime</b>	344
<b>Orange, California Valencia</b>	397
<b>Orange, Florida</b>	401
<b>Orange, Navel</b>	408
<b>Pomelo</b>	273*
<b>Tangerines/mandarin oranges</b>	238

*\*25 to 50% of nutrient data missing*

# A Note on Grapefruit

Although grapefruit is perfectly healthy for most people, it has a unique contraindication! This fruit contains high levels of **furanocoumarins**—compounds that interfere with the cytochrome P450 superfamily of liver enzymes, and as a result, create potentially harmful drug interactions.

Specifically, furanocoumarins get metabolized by the enzyme CYP3A4 and then bond the active site of the enzyme, inactivating it. When CYP3A4 activity gets impaired, the body no longer metabolizes many drugs as expected—including many statins, calcium channel blockers, loratadine (Claritin), clarithromycin, certain pain medications, and some immunosuppressants. As a result, one of two things can happen:

1. Blood levels of these drugs can rise (if the drug requires liver enzymes to become inactivated), causing in more severe side effects or even brand new side effects; or,
2. Blood levels of the drugs can fall (if the drug requires liver enzymes to become an active metabolite), resulting in a loss of the therapeutic effect.

In either case, the consequence can be dangerous! In all, over 85 medications are either known or predicted to interact with grapefruit, and eating just a single whole grapefruit or drinking 200 mL of grapefruit juice can be enough to cause drug overdose toxicity. Moral of the story, we should make sure to double-check any prescriptions for interactions before we enjoy our grapefruit!



# To Juice or Not to Juice?!

One of the most popular ways to consume citrus is in the form of juice. But, how does this stack up to eating citrus whole?

First, the good news: citrus juice indeed delivers some of the good stuff citrus contains, and is much more than empty calories! Along with boasting plenty of vitamin C, citrus juice retains a number of phytonutrients (especially flavanones) that contribute to these fruits' health benefits.

[A 2021 review](#) concluded that citrus juice may help beneficially modulate inflammatory and immune responses in the body, while [a 2017 review](#) found that citrus juice has a number of impressive anti-cancer properties. Likewise, a [2020 controlled clinical trial](#) found that habitual orange juice consumption (300 mL daily for 60 days) created positive shifts in the gut microbiota, in turn enhancing glycemic control and lowering some blood lipids (including reducing fasting glucose, insulin, insulin resistance, and triglycerides)! In general, citrus juice appears to have prebiotic properties owing to some of its phytonutrients (like hesperidin and naringin).

However, while a glass of fresh-squeezed OJ here and there certainly won't hurt, eating the whole fruit is really where it's at! Research looking at the bioactive compound content and antioxidant capacity of different parts of citrus fruits—the juice sacs, the segment membranes, and the segments—shows that the concentration of phenolic compounds and total antioxidant capacity is highest in the segment membranes, which get removed during juicing. Similarly, studies of Cara Cara oranges, navel oranges, and clementine mandarins have found higher carotenoid values in the pulp versus juice.

On top of that, in nearly all citrus fruits, very high concentrations of phenolic compounds exist in the albedo—the white spongy layer between the fruit segments and the outer skin. (Although this part of the citrus fruit isn't necessarily the tastiest to eat, adding some of it to a smoothie or other recipe can help mask the flavor and deliver a major phytonutrient punch.)

So, while there's little to suggest citrus juice is harmful to health, opting for whole fruit whenever possible ensures we'll receive all the nutritional goodness available from these foods!



# Some Practical Pointers

To get the most out of our citrus fruits (both taste-wise and nutrient-wise), proper selection and storage is a must. Here are some tips for picking out the very best fruits, as well as keeping them fresh.

## Selection:

- Choose fruits that feel heavy for their size, as this often indicates juiciness.
- Look for fruits with smooth, firm skin, avoiding those with soft spots or wrinkles.
- Different citrus varieties have different colors when ripe, but in general, vibrant and uniform color is a good indicator of ripeness! (For example, oranges should have a bright orange hue, while lemons should be a rich yellow.)
- Select fruits that emit a fresh, strong, citrusy aroma. This can be a sign of ripeness and flavor.
- Opt for fruits that are average in size for their variety. Extremely large or small fruits may not be as flavorful.



## Storage:

**Fun fact:** we can maximize our nutrition intake from citrus by how we store these fruits! There's some evidence that storing citrus at temperatures higher than 5°C (about 41°F) for long periods of time increases their loss of vitamin C, so it's best to eat our citrus soon after bringing them home, or storing it in very cool temperatures. Once refrigerated, citrus can store for several weeks without going bad!

## Seasonality:

The specific seasons for citrus fruits can vary depending on the region and climate. However, here's a general guide for when some popular citrus fruits reach their peak season:

- **NAVEL ORANGES:** November until March or April
- **VALENCIA ORANGES:** March to September
- **GRAPEFRUITS, WHITE OR YELLOW:** November to June



- **GRAPEFRUITS, PINK OR RED:** December to June
- **LEMONS:** year-round, but peak season from May to August
- **LIMES:** year-round, with peak season in summer
- **BLOOD ORANGES:** December until April
- **CLEMENTINES:** Between late October and January
- **TANGERINES:** November to April
- **POMELOS:** Fall and winter months, typically from November to April
- **KUMQUATS:** November to June

Many citrus fruits are available year-round in grocery stores due to global sourcing. For the freshest and most flavorful citrus, though, consider purchasing fruits when they're in peak season in your local area!



# Recipes



BREAKFAST

# Cranberry Orange Loaf

**PREP TIME**

10 minutes

**COOK TIME**

50 minutes

**YIELD**

2 loaves

2 cups all purpose flour, gluten-free flour blend, or grain-free flour alternative

1 cup granulated sugar of choice

½ teaspoon baking powder

½ teaspoon salt

½ teaspoon baking soda

2 tablespoons oil of choice

½ cup orange juice concentrate

2 tablespoons boiled water

1 egg

½ cup chopped fresh cranberries

1 cup slivered almonds

1. Preheat oven to 350°F. Grease two loaf pans or line with parchment paper.
2. Sift together flour, sugar, baking powder, salt, and baking soda.
3. In a separate bowl mix together oil, orange juice concentrate and boiled water. Add egg and whisk to combine.
4. Fold the wet ingredients into the dry ingredients.
5. Add the cranberries and almonds and mix to combine.
6. Pour batter into loaf pans and bake for 50 minutes.



**TIP:** to make muffins instead, grease a muffin tin or line with silicone or paper liners and bake at 350°F for 30-35 minutes.



# APPETIZERS



# Tuna Ceviche

**PREP TIME**

30 minutes + marinating

**COOK TIME**

none

**YIELD**

2-3 servings

$\frac{3}{4}$  pounds sushi-grade ahi tuna,  
sliced into very thin strips

$\frac{1}{2}$  red onion, thinly sliced

$\frac{2}{3}$  cup lime juice (about 6 limes)

1 teaspoon finely grated lime zest

$\frac{1}{4}$  teaspoon sea salt

$\frac{1}{2}$  cup chopped fresh cilantro

1 large avocado, peeled, pitted and cubed

1. Combine the tuna, onion, lime juice and zest, and salt in a bowl. Cover and refrigerate to marinate for 1 hour, stirring every 15 to 20 minutes.
2. Stir in the cilantro and avocado immediately before serving.





# ENTRÉES

# Chicken Tagine with Preserved Lemon

**PREP TIME**

30 minutes +  
marinating time

**COOK TIME**

2 hours

**YIELD**

5 to 6 servings

2 skin preserved lemons (pg 35)

3 tablespoons lemon juice

2 tablespoons parsley, chopped

$\frac{3}{4}$  teaspoon salt

1 teaspoon black pepper

1 tablespoon ground ginger

2 teaspoons ground cumin

3 pounds chicken legs and/or thighs

3 tablespoons olive oil

2 large onions, chopped

5 cloves of garlic, crushed

2 pinches of saffron, optional

$\frac{1}{4}$  cup warm water

$\frac{1}{2}$  cup olives, optional

Crusty bread and/or french fries and  
harissa to serve, if desired

1. Slice preserved lemons in quarters. Remove any seeds and discard. Cut away the pulp and give a rough chop. Slice the peel and set aside.
2. Combine preserved lemon pulp, lemon juice, parsley, salt, pepper, ginger and cumin to form a thick paste. Add chicken and stir to coat. Marinate in the fridge for at least one hour, and up to overnight.
3. Coat the bottom of a tagine with olive oil. Mix the chopped onion and crushed garlic and layer on the bottom of the tagine.
4. Soak saffron threads, if using, in warm water for 10 minutes.
5. Layer the chicken on top of the onion layer. Pour any remaining marinade over the top. Pour the saffron water over the top (or plain water if not using saffron). Sprinkle the sliced preserved lemon peel over the top.



6. Cover, and slowly bring the tagine up to medium heat using a heat diffuser if you're using a clay tagine (to do this, heat on low for 5 minutes, then increase heat to medium). Once it comes to a simmer, about 15 minutes, reduce heat to low.
7. Cook for 1.5 hours, until chicken is falling off the bone. Uncover, add olives if using, and cook for an additional 10 to 15 minutes, to reduce the liquid. Taste and add additional salt and pepper, if needed.
8. Serve with crusty bread for dipping or serve with french fries and topped with harissa., if desired.



**TIP:** If you don't have a tagine, you'll need to add more water. Use 1 cup and top up as needed during cooking time. If using a Dutch oven or covered skillet, bring up to medium heat then reduce to low to maintain a slow simmer for 1.5 hours. If using a crockpot, cook on high for 5 hours. In either case, you can still cook uncovered for an additional 10 to 15 minutes to reduce the liquid, if needed.

# Cedar Plank Salmon With Dill and Capers

**PREP TIME**

20 minutes

**COOK TIME**

30 minutes

**YIELD**

4-5 servings

1 cedar grilling plank (large enough for all four fillets)

2 lemons

3 tablespoons chopped parsley

1 tablespoon chopped fresh dill

2 tablespoons capers, drained and chopped

1 clove garlic, minced

1 anchovy fillet, finely minced (or use ½ teaspoon anchovy paste)

¼ teaspoon sea salt

⅛ teaspoon cracked pepper

4 to 5 salmon fillets, with skin (about 1½ pounds)

1. Submerge cedar plank under water for at least an hour. Pat dry right before putting on the grill.
2. Thinly slice 1½ lemons. For the remaining half lemon, zest the peel and juice.
3. In a small bowl, combine lemon juice, lemon zest, parsley, dill capers, garlic, anchovy, salt and pepper.
4. Spread the seasoning evenly over the top of the salmon fillets. Top with lemon slices.
5. Preheat grill to medium-high heat (about 450°F). Place the soaked cedar plank on the grill grates and close the lid. When the plank begins to smoke and lightly char, about 6 to 7 minutes, remove from the grill.
6. Place prepared salmon fillets on the charred side of the cedar plank and return to the grill. Close the lid and grill until the salmon is fully cooked, segments should flake apart easily and salmon should be opaque throughout, about 15 minutes per inch thickness.



# SOUPS AND SALADS

# Citrus, Fig, And Walnut Salad

**PREP TIME**

10 minutes

**COOK TIME**

none

**YIELD**

1-2 servings

2 cups arugula  
2 cups baby kale  
3 tablespoons thinly sliced red onion  
1 large orange or blood orange, segmented  
4 kumquats (if you can't find them, double the orange), thinly sliced (discard seeds but leave peel on)  
3 dried figs, cut into ½-inch pieces

½ cup walnut halves or large pieces  
½ avocado, peeled, pitted, and divided into ½- to ¾-inch pieces  
2 tablespoons olive oil, or oil of choice  
1 tablespoon balsamic vinegar  
Pinch cracked pepper  
Pinch of sea salt

1. Gently toss arugula, kale, red onion, orange segments, kumquats, dried fig and walnut together. Top with avocado chunks.
2. **MAKE DRESSING:** in a small bowl, mix olive oil, balsamic vinegar, pepper and salt. Drizzle the dressing over the top immediately before serving.



**TIP:** You can also use regular kale to make this salad; remove and discard the stems and tear the leaves in bite-sized pieces.





# Asian Crunchy Noodle Salad

**PREP TIME**

20 minutes

**COOK TIME**

none

**YIELD**

3-4 servings

½ head thinly sliced Napa cabbage,  
about 6 cups

4 cups broccoli slaw, either bagged or  
shredded from broccoli stalks

½ cup chopped green onions

3 mandarin oranges, peeled and seg-  
mented

½ cup cooked and shelled edamame

1 tablespoon sesame oil

1 tablespoon olive oil or oil of choice

1 tablespoon rice vinegar

3 tablespoons soy sauce or coconut ami-  
nos

2 teaspoons grated fresh ginger

2 cloves fresh garlic, minced

2 tablespoons chopped fresh mint

½ teaspoon salt (less if using soy sauce)

1 cup crunchy noodle topping

1. Combine cabbage, slaw, green onions, oranges, and edamame in a large bowl.
2. Whisk or blend together oil, vinegar, soy sauce, ginger, garlic, mint and salt.
3. Pour dressing over salad.
4. Top with Crunchy Noodle topping.



**TIP:** Make it a meal by adding 4 chicken thighs, cooked and chopped.



SIDES

# Japanese Turnips With Orange Rosemary Pan Sauce

**PREP TIME**

15 minutes

**COOK TIME**

15 minutes

**YIELD**

3-4 servings

1 pound Japanese turnips, sliced  $\frac{1}{8}$  inch thick

2 large oranges

1 tablespoon chopped fresh rosemary

3 tablespoons butter or oil of choice

$\frac{1}{4}$  teaspoon sea salt, plus more to taste

1. Use a microplane zester, finely grate peel from one or both oranges to get 1 tablespoon of orange zest. Juice both oranges.
2. Heat skillet over medium-high heat and add butter.
3. Add turnip slices and sauté, stirring frequently, until they start to brown, about 3 to 4 minutes.
4. Add half of the orange juice, rosemary and salt. Continue to cook, stirring relatively frequently, until turnips are browned and fully cooked (soft but not mushy), about 10 to 12 minutes.
5. Add remaining orange juice and salt, stir to form a sauce then immediately remove from heat and serve. (If your sauce seems too runny, let the orange juice evaporate for 30 seconds or so, but don't heat too long or the sauce will separate.)



SAUCES

AND

CONDIMENTS

# Grapefruit Salsa

**PREP TIME**

30 minutes

**COOK TIME**

12 minutes

**YIELD**

8-10 servings

4 grapefruit, segmented  
2 teaspoons honey  
¼ onion, thinly sliced  
¼ cup chopped cilantro  
1 teaspoon lime zest  
Pinch of salt

1. Cut grapefruit segments in half.
2. Mix grapefruit, with honey, red onion, cilantro, lime zest and salt.
3. Chill in refrigerator until ready to serve.





# Preserved Lemons

**PREP TIME**

10 minutes, plus  
preserving time

**COOK TIME**

none

**YIELD**

4-5 preserved lemons

4-5 lemons

¼ cup salt

1 tablespoon granulated sugar

1. Clean the lemons well.
2. Slice just the tip of each lemon off. Then, placing the lemon flat on the cutting board, cut a large x across the top of the lemon, making sure not to cut all the way through so the lemon stays intact.
3. In a large bowl, combine the salt and sugar. Add the lemons to the bowl and stuff the salt and sugar mixture into each lemon. Toss the lemons in the remaining salt and sugar.
4. Cover the bowl with plastic wrap and refrigerate overnight or up to 24 hours.
5. Once the lemons have released some of their juices, move the lemons to a clean jar, along with the juices. Squish the lemons down into the jar until they are completely submerged in the liquid, adding additional lemon juice if needed.
6. Seal the jar and store in the refrigerator for at least 2 weeks, and up to 6 months.





DESSERT

# Lemon-Lime Bars

**PREP TIME**

20 minutes

**COOK TIME**

20 to 25 minutes

**YIELD**

16 2-inch squares

1½ cups all purpose flour, gluten-free flour blend, or grain-free flour alternative

½ cup butter or fat of choice

¼ cup powdered sugar

⅜ teaspoon salt, divided

⅓ cup lime juice (about 3 limes worth)

¼ cup lemon juice (about 2 lemons worth)

2 teaspoons lemon zest (about 1 lemons worth)

½ cup sour cream or dairy free alternative

5 eggs

1 cup cane sugar or granulated sugar of choice

1. Preheat oven to 350°F. You don't need to line your pan with parchment, but it does make it a little easier to remove on the other side, so up to you, I usually skip lining my pan.
2. In a bowl, knead together flour, butter, powdered sugar and ¼ teaspoon salt. This is easiest with your hands as it makes a very stiff dough (similar to pie crust dough in consistency).
3. Press dough into the bottom of an 8"x8" baking pan to form an even layer. Poke holes all over the top with the tines of a fork.
4. Bake for 20 minutes, until just starting to turn slightly golden. Meanwhile, prepare your custard.
5. Add remaining ingredients to a blender jar and pulse just to combine. Alternatively, you can whisk them together by hand.
6. Remove pan from the oven and pour the contents of your blender over the top. (You can do this while the shortbread layer is still hot, or if you're not quite ready when the shortbread is, it's totally okay if it cools down a little. You'll get slightly more distinct layers if the shortbread is still hot, but it works either way).



7. Return to the oven and bake an additional 20 to 25 minutes, until custard is set. (If you shake your pan slightly, the center shouldn't wobble.)
8. Cool completely before removing from pan. These are great chilled or at room temperature.
9. Sprinkle the top with additional powdered sugar, if desired. Cut into squares and serve.
10. Store any leftovers in an air-tight container on the counter for up to 3 days, or in the fridge for up to a week. I think these are even better on the second day!



**TIP:** For a more nutrient dense powdered sugar option, you can blend maple sugar in a blender for 30 seconds

# Souffléed Lemon Custard

**PREP TIME**

20 minutes

**COOK TIME**

30 minutes

**YIELD**

4 servings

3 large eggs, separated

 $\frac{3}{4}$  cups honey or sugar of choice $\frac{3}{4}$  cups whole milk or coconut milk $\frac{1}{4}$  cup lemon juice (about 2 lemons  
or 2-4 Meyer's lemons)

2 teaspoons lemon zest

2 tablespoons arrowroot powder or  
cornstarch $\frac{1}{4}$  teaspoon sea salt

1. Preheat oven to 350°F.
2. Whisk together egg yolk, honey, milk, lemon juice, lemon zest, arrowroot powder and sea salt.
3. In a medium bowl, beat egg whites using a hand mixer (or small standing mixer) until stiff peaks form.
4. Fold the egg whites into the yolk mixture until completely combined (it will still be quite runny, which is important for the layer separation while it bakes).
5. Pour into 2-quart ramekin or soufflé dish. Place dish into a large roasting pan and pour boiling water into the roasting pan around the ramekin, filling up to about halfway up the side of the ramekin.
6. Bake for 30 minutes, until set. Serve warm right out of the oven, or let cool to room temperature.



# Honey-Glazed Lemon-Lavender Cupcakes

**PREP TIME**

20 minutes

**COOK TIME**

20 minutes

**YIELD**

12 servings

½ cup olive oil or oil of choice

2 large eggs

⅔ cup maple syrup or honey, divided,  
or other liquid sugar

⅓ cups milk or dairy free alternative

¼ cup lemon juice, divided

1 tablespoon lemon zest

1 cup all purpose flour, gluten-free flour  
blend, or grain-free flour alternative

½ teaspoon baking soda

¼ teaspoon cream of tartar

½ teaspoon sea salt

1 tablespoon lavender

1. Preheat oven to 325°F. Grease and flour wells of a mini-cake pan or muffin pan, or use a silicone cake pan.
2. Beat oil, eggs, ½ cup honey, milk, 1 tablespoon lemon juice and lemon zest in the bowl of a standing mixer with the whisk attachment until creamy.
3. Combine the remaining ingredients and fold into the egg mixture until fully combined.
4. Pour batter into the prepared cake pans.
5. Bake for 18 to 22 minutes, or until a toothpick inserted into the middle of a cake comes out clean. Cool in pan for 10 minutes.



6. **MAKE GLAZE:** Place remaining 3 tablespoons lemon juice and 3 tablespoons honey in a metal mixing bowl placed over a small saucepot with a small amount of simmering water (the water should not touch the bottom of the mixing bowl). Stir constantly, until the honey melts into the lemon juice.
7. Transfer the still-warm mini-cakes to a serving platter. Using a toothpick, carefully and gently poke holes all over the top of each cake, then using a pastry brush, brush the honey-lemon glaze over top of each cake.



**TIP:** You can also make this into a loaf, in which case it'll take 60 to 70 minutes to bake.

# About the Creators of this Book

## Dr. Sarah Ballantyne, PhD

### FOUNDER OF NUTRIVORE

Award-winning public speaker, New York Times bestselling author and world-renowned health expert, Dr. Sarah Ballantyne, PhD believes the key to improving public health is scientific literacy. She creates educational resources to help people improve their day-to-day diet and lifestyle choices, empowered and informed by the most current evidenced-based scientific research.



## Charissa Joy, AOS

### CHIEF OPERATIONS OFFICER

Charissa Joy has over 15 years of experience working in the wellness space. Charissa has many roles on the team. She is Dr. Sarah's right hand woman and touches every part of Dr. Sarah's businesses. She manages all communications for Nutrivore, both external and internal. She is the project and team manager. She handles all marketing internal and external marketing, as well as all brand/affiliate partnerships.



## Nicole Anouar, BA

### GRAPHIC DESIGNER

Nicole Anouar has a B.A in graphic design from the University of San Francisco and specializes in branding and educational design for healers and health professionals in the online space. With 8+ years of education and practice in graphic design, content marketing and ancestral lifestyle tradition, Nicole expresses her passion for truth and her love for alternative living into the work she does every day.



## Kiersten Peterson, BA, NTP

### CONTENT CREATOR AND PHOTOGRAPHER

Kiersten is a Content Creator for Nutrivore with a focus on recipe creation, practical resources and food photography, with a little writing on the side. After experiencing full body healing with the help of Dr. Sarah's and others' work, she now enjoys finding and creating beauty both in her work for Nutrivore and in her home as she raises two daughters alongside her military husband.





## Denise Minger

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Denise is a health researcher and author of the best-selling book, “Death By Food Pyramid”—an award-winning exposé of the forces that shaped our dietary guidelines and beliefs, and that’s been featured in documentaries, UPenn medical writing curricula, the Nutritional Therapy Association certification program, and numerous other health education courses around the world.



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Jacqueline has a degree in Chemical Engineering (Bachelor of Applied Science) from the University of British Columbia in Canada, along with a master’s degree in renewable energy technology from the United Kingdom. She has also achieved her Professional Engineering designation in her home province of Alberta, Canada.



Jacqueline does a wide variety of tasks for Nutrivore including, article writing, data design, data visualization, all things excel, research, and content creation. When she’s not googling her way out of the excel jungle, she is parenting her two young boys and spending time outdoors.

## Lisa Hunter, MSc

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Lisa has a Bachelor of Science degree in Chemistry and Biochemistry, a Master of Science degree in Biochemistry, and worked in the pharmaceutical industry developing bio-products for 7 years, prior to taking time off to raise her two children.



On Nutrivore.com she is a researcher, writer, and content creator and is responsible for developing and maintaining the expanded Nutrivore Score database of over 7,500 foods (plus many of the nerdy puns sprinkled throughout the website!).

# REFERENCES

- Ali MY, Zaib S, Rahman MM, Jannat S, Iqbal J, Park SK, Chang MS. Didymin, a dietary citrus flavonoid exhibits anti-diabetic complications and promotes glucose uptake through the activation of PI3K/Akt signaling pathway in insulin-resistant HepG2 cells. *Chem Biol Interact.* 2019 May 25;305:180-194. doi: 10.1016/j.cbi.2019.03.018.
- Aune D, Giovannucci E, Boffetta P, Fadnes LT, Keum N, Norat T, Greenwood DC, Riboli E, Vatten LJ, Tonstad S. Fruit and vegetable intake and the risk of cardiovascular disease, total cancer and all-cause mortality-a systematic review and dose-response meta-analysis of prospective studies. *Int J Epidemiol.* 2017 Jun 1;46(3):1029-1056. doi: 10.1093/ije/dyw319.
- Bae JM, Kim EH. Dietary intakes of citrus fruit and risk of gastric cancer incidence: an adaptive meta-analysis of cohort studies. *Epidemiol Health.* 2016 Jul 25;38:e2016034. doi: 10.4178/epih.e2016034.
- Bae JM, Lee EJ, Guyatt G. Citrus fruit intake and pancreatic cancer risk: a quantitative systematic review. *Pancreas.* 2009 Mar;38(2):168-74. doi: 10.1097/MPA.0b013e318188c497.
- Bailey DG, Dresser G, Arnold JM. Grapefruit-medication interactions: forbidden fruit or avoidable consequences? *CMAJ.* 2013 Mar 5;185(4):309-16. doi: 10.1503/cmaj.120951.
- Bertuccio P, Alicandro G, Rota M, Pelucchi C, Bonzi R, Galeone C, Bravi F, Johnson KC, Hu J, Palli D, Ferraroni M, López-Carrillo L, Lunet N, Ferro A, Malekzadeh R, Zaridze D, Maximovitch D, Vioque J, Navarrete-Munoz EM, Pakseresht M, Hernández-Ramírez RU, López-Cervantes M, Ward M, Pourfarzi F, Tsugane S, Hidaka A, Zhang ZF, Kurtz RC, Lagiou P, Lagiou A, Boffetta P, Boccia S, Negri E, La Vecchia C. Citrus fruit intake and gastric cancer: The stomach cancer pooling (StoP) project consortium. *Int J Cancer.* 2019 Jun 15;144(12):2936-2944. doi: 10.1002/ijc.32046.
- Bianchi F, Larsen N, de Mello Tieghi T, Adorno MAT, Kot W, Saad SMI, Jespersen L, Sivieri K. Modulation of gut microbiota from obese individuals by in vitro fermentation of citrus pectin in combination with *Bifidobacterium longum* BB-46. *Appl Microbiol Biotechnol.* 2018 Oct;102(20):8827-8840. doi: 10.1007/s00253-018-9234-8.
- Brasili E, Hassimotto NMA, Del Chierico F, Marini F, Quagliariello A, Sciubba F, Miccheli A, Putignani L, Lajolo F. Daily Consumption of Orange Juice from *Citrus sinensis* L. Osbeck cv. Cara Cara and cv. Bahia Differently Affects Gut Microbiota Profiling as Unveiled by an Integrated Meta-Omics Approach. *J Agric Food Chem.* 2019 Feb 6;67(5):1381-1391. doi: 10.1021/acs.jafc.8b05408.
- Cao X, Guo X, Fang X, Ru S, Li E. Effects of Poncirin, a Citrus Flavonoid and Its Aglycone, Isosakuranetin, on the Gut Microbial Diversity and Metabolomics in Mice. *Molecules.* 2022 Jun 6;27(11):3641. doi: 10.3390/molecules27113641.

- Chang SC, Cassidy A, Willett WC, Rimm EB, O'Reilly EJ, Okereke OI. Dietary flavonoid intake and risk of incident depression in midlife and older women. *Am J Clin Nutr*. 2016 Sep;104(3):704-14. doi: 10.3945/ajcn.115.124545.
- Choi SS, Lee SH, Lee KA. A Comparative Study of Hesperetin, Hesperidin and Hesperidin Glucoside: Antioxidant, Anti-Inflammatory, and Antibacterial Activities In Vitro. *Antioxidants (Basel)*. 2022 Aug 20;11(8):1618. doi: 10.3390/antiox11081618.
- Cirmi S, Maugeri A, Ferlazzo N, Gangemi S, Calapai G, Schumacher U, Navarra M. Anticancer Potential of Citrus Juices and Their Extracts: A Systematic Review of Both Preclinical and Clinical Studies. *Front Pharmacol*. 2017 Jun 30;8:420. doi: 10.3389/fphar.2017.00420.
- Cirmi S, Navarra M, Woodside JV, Cantwell MM. Citrus fruits intake and oral cancer risk: A systematic review and meta-analysis. *Pharmacol Res*. 2018 Jul;133:187-194. doi: 10.1016/j.phrs.2018.05.008.
- Deng Z, Hassan S, Rafiq M, Li H, He Y, Cai Y, Kang X, Liu Z, Yan T. Pharmacological Activity of Eriodictyol: The Major Natural Polyphenolic Flavanone. *Evid Based Complement Alternat Med*. 2020 Dec 12;2020:6681352. doi: 10.1155/2020/6681352.
- Feng XX, Wang MX, Li M, Tang X, Jiang H, Wang R, Ma L, Yin Y, Wu CR. Citrus fruit intake and the risk of nasopharyngeal carcinoma. *Asia Pac J Clin Nutr*. 2019;28(4):783-792. doi: 10.6133/apjcn.201912\_28(4).0015.
- Ferreira PS, Manthey JA, Nery MS, Spolidorio LC, Cesar TB. Low doses of eriocitrin attenuate metabolic impairment of glucose and lipids in ongoing obesogenic diet in mice. *J Nutr Sci*. 2020 Dec 14;9:e59. doi: 10.1017/jns.2020.52.
- Fidélis M, Milenkovic D, Sivieri K, Cesar T. Microbiota modulation and effects on metabolic biomarkers by orange juice: a controlled clinical trial. *Food Funct*. 2020 Feb 26;11(2):1599-1610. doi: 10.1039/c9fo02623a.
- Filippini T, Adani G, Malavolti M, Garuti C, Cilloni S, Vinceti G, Zamboni G, Tondelli M, Galli C, Costa M, Chiari A, Vinceti M. Dietary Habits and Risk of Early-Onset Dementia in an Italian Case-Control Study. *Nutrients*. 2020 Nov 29;12(12):3682. doi: 10.3390/nu12123682.
- Gong Y, Dong R, Gao X, Li J, Jiang L, Zheng J, Cui S, Ying M, Yang B, Cao J, He Q. Neohesperidin prevents colorectal tumorigenesis by altering the gut microbiota. *Pharmacol Res*. 2019 Oct;148:104460. doi: 10.1016/j.phrs.2019.104460.
- Gualdani R, Cavalluzzi MM, Lentini G, Habtemariam S. The Chemistry and Pharmacology of Citrus Limonoids. *Molecules*. 2016 Nov 13;21(11):1530. doi: 10.3390/molecules21111530.
- Guo S, Xing N, Xiang G, Zhang Y, Wang S. Eriodictyol: a review of its pharmacological activities and molecular mechanisms related to ischemic stroke. *Food Funct*. 2023 Feb 21;14(4):1851-1868. doi: 10.1039/d2fo03417d.

- Harris HR, Eke AC, Chavarro JE, Missmer SA. Fruit and vegetable consumption and risk of endometriosis. *Hum Reprod.* 2018 Apr 1;33(4):715-727. doi: 10.1093/humrep/dey014.
- Hwang SL, Yen GC. Neuroprotective effects of the citrus flavanones against H<sub>2</sub>O<sub>2</sub>-induced cytotoxicity in PC12 cells. *J Agric Food Chem.* 2008 Feb 13;56(3):859-64. doi: 10.1021/jf072826r.
- Johnson JL, Rupasinghe SG, Stefani F, Schuler MA, Gonzalez de Mejia E. Citrus flavonoids luteolin, apigenin, and quercetin inhibit glycogen synthase kinase-3 $\beta$  enzymatic activity by lowering the interaction energy within the binding cavity. *J Med Food.* 2011 Apr;14(4):325-33. doi: 10.1089/jmf.2010.0310.
- Liang S, Lv G, Chen W, Jiang J, Wang J. Citrus fruit intake and bladder cancer risk: a meta-analysis of observational studies. *Int J Food Sci Nutr.* 2014 Nov;65(7):893-8. doi: 10.3109/09637486.2014.917151.
- Lima ACD, Cecatti C, Fidélis MP, Adorno MAT, Sakamoto IK, Cesar TB, Sivieri K. Effect of Daily Consumption of Orange Juice on the Levels of Blood Glucose, Lipids, and Gut Microbiota Metabolites: Controlled Clinical Trials. *J Med Food.* 2019 Feb;22(2):202-210. doi: 10.1089/jmf.2018.0080.
- Liu S, Lou Y, Li Y, Zhang J, Li P, Yang B, Gu Q. Review of phytochemical and nutritional characteristics and food applications of Citrus L. fruits. *Front Nutr.* 2022 Jul 18;9:968604. doi: 10.3389/fnut.2022.968604.
- Lu JF, Zhu MQ, Zhang H, Liu H, Xia B, Wang YL, Shi X, Peng L, Wu JW. Neohesperidin attenuates obesity by altering the composition of the gut microbiota in high-fat diet-fed mice. *FASEB J.* 2020 Sep;34(9):12053-12071. doi: 10.1096/fj.201903102RR.
- Mahmoud AM, Hernández Bautista RJ, Sandhu MA, Hussein OE. Beneficial Effects of Citrus Flavonoids on Cardiovascular and Metabolic Health. *Oxid Med Cell Longev.* 2019 Mar 10;2019:5484138. doi: 10.1155/2019/5484138.
- Miles EA, Calder PC. Effects of Citrus Fruit Juices and Their Bioactive Components on Inflammation and Immunity: A Narrative Review. *Front Immunol.* 2021 Jun 24;12:712608. doi: 10.3389/fimmu.2021.712608.
- Mitra S, Lami MS, Uddin TM, Das R, Islam F, Anjum J, Hossain MJ, Emran TB. Prospective multifunctional roles and pharmacological potential of dietary flavonoid narirutin. *Biomed Pharmacother.* 2022 Jun;150:112932. doi: 10.1016/j.biopha.2022.112932.
- Panche AN, Diwan AD, Chandra SR. Flavonoids: an overview. *J Nutr Sci.* 2016 Dec 29;5:e47. doi: 10.1017/jns.2016.41.
- Patel DK. Therapeutic Potential of Poncirin Against Numerous Human Health Complications: Medicinal Uses and Therapeutic Benefit of an Active Principle of Citrus Species. *Endocr Metab Immune Disord Drug Targets.* 2021;21(11):1974-1981. doi: 10.2174/1871530321666210108122924.
- Pyrzynska K. Hesperidin: A Review on Extraction Methods, Stability and Biological Activities. *Nutrients.* 2022 Jun 9;14(12):2387. doi: 10.3390/nu14122387.

- Rapisarda P, Amenta M, Ballistreri G, Fabroni S, Timpanaro N. Distribution, Antioxidant Capacity, Bioavailability and Biological Properties of Anthocyanin Pigments in Blood Oranges and Other Citrus Species. *Molecules*. 2022 Dec 8;27(24):8675. doi: 10.3390/molecules27248675.
- Ribeiro CB, Ramos FM, Manthey JA, Cesar TB. Effectiveness of Eriomin® in managing hyperglycemia and reversal of prediabetes condition: A double-blind, randomized, controlled study. *Phytother Res*. 2019 Jul;33(7):1921-1933. doi: 10.1002/ptr.6386.
- Rodrigo MJ, Cilla A, Barberá R, Zacarías L. Carotenoid bioaccessibility in pulp and fresh juice from carotenoid-rich sweet oranges and mandarins. *Food Funct*. 2015 Jun;6(6):1950-9. doi: 10.1039/c5fo00258c.
- Sheng T, Shen RL, Shao H, Ma TH. Citrus fruit intake and incidence of renal cell carcinoma: A meta-analysis of observational studies. *Asia Pac J Clin Oncol*. 2023 Jan 19. doi: 10.1111/ajco.13925.
- Silveira JQ, Dourado GK, Cesar TB. Red-fleshed sweet orange juice improves the risk factors for metabolic syndrome. *Int J Food Sci Nutr*. 2015;66(7):830-6. doi: 10.3109/09637486.2015.1093610.
- Song JK, Bae JM. Citrus fruit intake and breast cancer risk: a quantitative systematic review. *J Breast Cancer*. 2013 Mar;16(1):72-6. doi: 10.4048/jbc.2013.16.1.72.
- Stevens Y, Rymenant EV, Grootaert C, Camp JV, Possemiers S, Masclee A, Jonkers D. The Intestinal Fate of Citrus Flavanones and Their Effects on Gastrointestinal Health. *Nutrients*. 2019 Jun 27;11(7):1464. doi: 10.3390/nu11071464.
- Testai L, Calderone V. Nutraceutical Value of Citrus Flavanones and Their Implications in Cardiovascular Disease. *Nutrients*. 2017 May 16;9(5):502. doi: 10.3390/nu9050502.
- Vingeliene S, Chan DS, Aune D, Vieira AR, Polemiti E, Stevens C, Abar L, Rosenblatt DN, Greenwood DC, Norat T. An update of the WCRF/AICR systematic literature review on esophageal and gastric cancers and citrus fruits intake. *Cancer Causes Control*. 2016 Jul;27(7):837-51. doi: 10.1007/s10552-016-0755-0. Epub 2016 May 6.
- Wang A, Zhu C, Fu L, Wan X, Yang X, Zhang H, Miao R, He L, Sang X, Zhao H. Citrus Fruit Intake Substantially Reduces the Risk of Esophageal Cancer: A Meta-Analysis of Epidemiologic Studies. *Medicine (Baltimore)*. 2015 Sep;94(39):e1390. doi: 10.1097/MD.0000000000001390.
- Wang J, Gao J, Xu HL, Qian Y, Xie L, Yu H, Qian BY. Citrus fruit intake and lung cancer risk: A meta-analysis of observational studies. *Pharmacol Res*. 2021 Apr;166:105430. doi: 10.1016/j.phrs.2021.105430.
- Wang X, Li D, Liu F, Cui Y, Li X. Dietary citrus and/or its extracts intake contributed to weight control: Evidence from a systematic review and meta-analysis of 13 randomized clinical trials. *Phytother Res*. 2020 Aug;34(8):2006-2022. doi: 10.1002/ptr.6673.
- Wu GA, Terol J, Ibanez V, López-García A, Pérez-Román E, Borredá C, Domingo C, Tadeo FR, Carbonell-Caballero J, Alonso R, Curk F, Du D, Ollitrault P, Roose ML, Dopazo J, Gmitter FG, Rokhsar DS, Talon M.

Genomics of the origin and evolution of Citrus. *Nature*. 2018 Feb 15;554(7692):311-316. doi: 10.1038/nature25447.

Wu ZY, Chen JL, Li H, Su K, Han YW. Different types of fruit intake and colorectal cancer risk: A meta-analysis of observational studies. *World J Gastroenterol*. 2023 May 7;29(17):2679-2700. doi: 10.3748/wjg.v29.i17.2679.

Yamada T, Hayasaka S, Shibata Y, Ojima T, Saegusa T, Gotoh T, Ishikawa S, Nakamura Y, Kayaba K; Jichi Medical School Cohort Study Group. Frequency of citrus fruit intake is associated with the incidence of cardiovascular disease: the Jichi Medical School cohort study. *J Epidemiol*. 2011;21(3):169-75. doi: 10.2188/jea.je20100084.

Zhang S, Tomata Y, Sugiyama K, Sugawara Y, Tsuji I. Citrus consumption and incident dementia in elderly Japanese: the Ohsaki Cohort 2006 Study. *Br J Nutr*. 2017 Apr;117(8):1174-1180. doi: 10.1017/S000711451700109X.

Zhao W, Liu L, Xu S. Intakes of citrus fruit and risk of esophageal cancer: A meta-analysis. *Medicine (Baltimore)*. 2018 Mar;97(13):e0018. doi: 10.1097/MD.00000000000010018.