

TAME THE FIRE &



**AWAKEN THE
BEAST**

Evidence-based lifestyle interventions to
reduce inflammation in sports.

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It's not normal to:

Train with persisting pain once you're >25
years old

Have minor injuries all over your body

Have morning stiffness anywhere in your
body for longer than 30 minutes after
waking up.

It's absolutely not normal to:

Have digestive issues, a bloated feeling or
food sensitivities coming up when you age

Be moody when you did not snack, or be
hungry all the time

Experience brain fog during the day.

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- I. Introduction.
- II. Your **brain** on fire.
- III. Your **body** on fire.
- IV. Your **gut microbiome** on fire.
- V. Awaken the beast, but first: **Sleep**.
- VI. Food is a real art: The science behind the anti-inflammatory properties of **eating by the rainbow**.



I. INTRODUCTION.

If you work in the health scene, or if you're a performance coach or an athlete yourself, you might have heard the term '**inflammation**' before. It gets thrown around quite often, as if it's a normal part of training: *'Awfch I have some inflammation in my knee, let's warm-up 2 minutes longer, train as if nothing's wrong, and ice it afterwards'*. That could work for some of us, but if the pain persists for longer than a few months, it keeps coming back, or if minor injuries occur on different places in your body, you might want to rethink that silly statement.

To put it simply, a short-term, acute inflammation is essential to health. It helps promote healing and supports immune function to keep you feeling your best. However, chronic inflammation is like the bad boyfriend you had in high school: everyone warned you about him, but you went for it anyway.

Sustained high levels of inflammation long-term is not only harmful, but it can be downright detrimental to your health. In fact, research suggest it's an underlying factor for diseases later in life, such as bowel problems, hearth disease, diabetes, depression, cognitive deterioration and cancer.¹⁻⁵

Fortunately, there are ways to improve your recovery and reduce inflammation, while positively impacting your performance and overall health in the process. Let's dive right in and take a closer look at 'how to tame the fire, and (re)awaken the beast' with evidence-based lifestyle interventions.

“Chronic inflammation is like the bad boyfriend you had in high school: everyone warned you about him, but you went for it anyway.”

II. YOUR BRAIN ON FIRE.

We're made aware of what chronic physical stress can do to our body, whereas very often it's our mental state contributing to chronic stressful states. Chronic stress of any kind knocks your body out of balance, causing low-grade inflammation throughout your body.

This chronic stress, and the low-grade inflammation cascades it manifests in our body because of the constant 'survival' mode we're in, may be the one leading underlying factor for the many chronic diseases of our society.^{6,7}

Look at it this way: acute stress is like your beloved mother protecting you from acute danger, yet chronic stress is like your angry stepmother, giving you a hard time every time again, just when you thought she would finally be gone.

PREVENT CHRONIC STRESS It's no secret our modern life tends to be quite... noisy. Never in our evolutionary history we had to experience so many distractions, possibilities, to-do's,... than today in our 24/7 online society. We should be aware that every thought, every event and every trigger, needs to be processed and made sense of in your brain. **Our brain really isn't evolutionary wired to overcome such a noisy world.**⁸ To prevent your brain from exploding due to all the stressors it receives on a daily basis, you might want to take a time-out from the world and **find stillness**. Indeed, those seemingly soft strategies have profound anti-inflammatory effects throughout your body. When put under a scan while meditating, we see your brain lights up very actively, as if you're performing a delicate brain surgery on your own mind. This is **neuroplasticity at its best**.

TIPS TO FIND STILLNESS IN A NOISY WORLD

Find stillness

Be mindful of the moment you're in for 5 minutes a day.

Search 'guided meditation'-, 'yoga nidra'-, 'mindfulness'-lists on Spotify or use apps such as Headspace or Calm

Focus on your breath

A few slow, conscious breaths elicit profound effects on your autonomic system.

Try 4-4-8 breathing where you breathe in for 4 seconds, hold for 4, and breathe out for 8, or try 'sigh-breathing': inhale, inhale some more, and breathe out.

Me-time

Forget the 24/7 distractions of our society for a moment.

Carefully schedule some me-time in your week planning and make it a priority.

Body meets breath meets brain

Routinely do yoga workouts, these are easy to find online: try 'Yoga with Adriene', 'Boho beautiful' or 'Alo yoga'.

“It’s really disturbing our education system is so focused on learning external things such as politics, math, statistics and biology, while we hardly ever learn to appreciate what is inside our own mind and brain.

BECOME RESILIENT It seems that **good relationships** and having a strong **purpose in life** or a reason to wake every the morning, buffers us against the many stressors life throws at us, and protects us from dying early.^{9,10} Indeed research states that we need to embrace life’s struggles for good health, to form an **harmonious balance between good and bad stressors**. This balance is indeed hard to find. Books such as *Ikigai* or the work of Laurie Santos can be helpful.

What really makes us happy?

We as humans are terrible at predicting what really makes us happy. For example: our brain is wired to try to be better or wealthier than our neighbors or peers, only to find out that it doesn’t really makes us happy on the long run.

Enroll in Laurie Santos’ course ‘The Science of Well-being’ or listen to her podcast ‘The Happiness Lab’.

TAME THE STRESS **Body- and breathwork** offer useful tools to tonify the vagus nerve. This nerve is implicated in your **parasympathetic system**. This is a difficult word for the state you’re in when you’re at ease, ready to rest, digest and heal. The literature suggests these practices train the autonomic nervous system to be more resilient to stressors. Resulting in an improvement of a wide range of health outcomes, such as reducing inflammation.¹¹⁻¹⁵ Other studies looked deep into our metabolic-, brain-, and genetic functioning; finding out even brief yogic meditation interventions or relaxation techniques may reverse the pattern of inflammation pathways.¹⁶⁻¹⁹

III. YOUR BODY ON FIRE.

A balanced autonomic nervous system, the system that is involved in regulating your stress response, is key for a good immune regulation and healing. When your vagus nerve is functioning well, it is able to **activate the healing anti-inflammatory pathways**.¹⁵ Only when you are in that rest and digest phase, healing and regeneration of your body tissues will happen.

Training programs are most effective if you have the ability to recover from, and adapt to the stress placed on your body from a workout. There are a lot modalities out there to enhance recuperation. These are my favorite **evidence-based strategies aiming to balance the autonomic system, causing anti-inflammatory cascades throughout your body:**

HOT-COLD CONTRAST The current evidence base shows that contrast water therapy is superior to using passive recovery or rest after exercise in outcomes such as e.g. muscle soreness and muscle strength loss. Also, a lot of evidence point to the beneficial longevity effects of saunas,^{20,21} which are commonly taken in combination with ice baths.

Cold showers
Alternate between 20 seconds of hot and cold water in your shower
Sauna & ice cold water are also great

NATURE Going into nature has profound beneficial effects on blood pressure, heart rate and cortisol levels.^{22,23} The simple act of being with your bare feet on the ground, improves sleep and reduces pain and stress.²⁴

AROMATHERAPY Essential oils are extracts of flowers, fruits or leaves of plants or trees. You can easily put these oils into a diffuser to establish the desired aroma in the room. This looks like a wishy-washy thing, but it is backed-up by evidence in laboratory studies and animal models. Although this does not automatically translate to humans, there is no doubt you'll notice certain shifts in your mood when you smell it. Try it out! Your physiology will love it.

Try essential oils

Frankincense Anti-pancreas- & breastcancer ^{88,89}	Peppermint Focus, energy, concentration ⁸⁶	Grapefruit Anti-inflammatory, relaxing ⁸⁷	Citrus Focus, energy, concentration ⁸⁶	Eucalyptus Better respiratory function, anti-bacterial pathogens ⁹⁰
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IV. YOUR GUT MICROBIOME ON FIRE.

The food we eat has profound effects on our health, wellbeing and inflammation status. An unhealthy gut microbiome and a damaged gut barrier leads to overactivation of the immune system. Before we start which foods to include or to avoid to combat inflammation, we should explore what establishes good gut health. **It is really key to prioritize gut health above any diet fads, fasting regimes or supplements** – as your nutrient absorption will be deficient when you have poor gut health.

GUT MICROBIOME We've established a symbiotic relationship with trillions of microorganisms in our gut. Health-promoting effects of our good bacteria include boosting our immune system, improving digestion and absorption, making vitamins, inhibiting the growth of potential pathogens, and keeping us from feeling bloated. But, if you starve the good bacteria, and you make your gut microbes hangry, the bad bacteria can produce carcinogens, putrefy protein in our gut, produce toxins, mess up our bowel function, and cause infections or inflammation.²⁵⁻²⁸

“We are human, but we are not alone – there are trillions of microbes living in our gut. It contains the good, the bad, and the neutral. Your dietary choices impact their influence on your health.”

FOOD CHOICES Recent literature has shown a link between diet and microbiome changes. Both diet and the gut microbiome are linked to circulating metabolites that may modulate inflammation.^{29,30} It is now known that the gut microbiome can rapidly respond to altered diet.³¹

DIETARY FIBER Dietary fiber from natural plant foods such as beans, greens, grains, nuts and seeds are metabolized by the gut microbiome into Short Chain Fatty Acids (SCFAs), serving as fuel for the intestinal mucosa, having anti-inflammatory effects and lower risk of cardiovascular diseases.³²⁻³⁴ Building your diet around a diversity of unprocessed plant foods is therefore undisputedly the most important thing you can do when it comes to gut health.²⁷

Healthy food choices for your gut microbes & overall health

Include: whole plant foods, resistant starch foods, (cruciferous) vegetables & fruits, whole grains, beans & legumes

Don't forget: SMASH fish/seafood, avocado, turmeric, ginger, garlic, berries, nuts & seeds, extra virgin olive oil, green tea and fermented foods.

Optional: eggs, poultry, tofu and tempeh

Include, but don't overdo: starchy foods (potatoes & pasta), alcohol, real maple syrup or raw honey, coffee or black tea

Limit: Artificial sweeteners, refined grains, processed meat, processed food, trans fats, fried foods, saturated fats, food additives

COMMON SPORTS MISTAKES

It sounds stupid, but: listen to your body in the first place. Nutrition advice, or anything really, should be individually tailored. Not one person is the same, more so, even though there are genetic factors influencing the gut microbiome,³⁵ twins may respond very differently to certain food challenges.³⁶ There are many roads to success, or in this case, a reduction in inflammation and an improvement in health, but there are certain rules you should keep in mind.

1. ANTIBIOTICS AND NSAID'S The use of antibiotics is deleterious for your gut ecology.³⁷ Only take it when you really need it. Also, don't take anti-inflammatory medications like candy, it has many asymptomatic side-effects and alters the gut microbiota, making them hangry.^{38,39}

“You don't want trillions of hangry microorganisms messing around with your health. Give them a rainbow colored diversity of unprocessed (mainly plant-based) foods!”

2. CONSTANT CARB-LOADING Constant loading with high-glycemic foods such as ‘sport’ drinks, gels or energy bars increases the susceptibility to **develop chronic inflammation** through different pathways.⁴⁰⁻⁴² Stop grabbing those overprocessed, overmarketed sport drinks, gels or energy bars, and start eating unprocessed foods. You know, those who you can recognize from nature. Most of them release carbs in a steady way and are chock-full of fiber and nutrients your body needs for performance, while balancing your satiety. Switching from sugary ‘sport’ drinks or energy gels to whole foods, might decrease energy dips, cravings and will increase your gut health.

Energy dip?

During competition: replace sugary drinks/ gels with dates, dried fruit, watermelon, potato salads, ...

Try to become metabolically flexible during training periods:

Implement fasting strategies such as eating in a window of 10h/day, snack less, hydrate and eat less processed foods.

3. PROTEIN OVERLOADING Firstly, good quality controlled trials evaluating the benefits of high protein intake conclude that there is **no evidence to support the efficacy of protein supplementation** to enhance anaerobic power, overall performance or body composition in trained athletes.^{43,44 45} Secondly, all reviews and guidelines state that protein is indeed important, aiming for **0.8g protein/kg body weight per day for the general adult population, to 1.7 g for heavy resistance athletes.**^{46,47} Anything above that offers no extra benefit and may result in digestive, renal and vascular abnormalities and should be avoided.⁴⁸ A recent meta-analysis of 7786 participants states that higher protein intake than the recommended value, is associated with higher all-cause mortality.⁴⁹ There are more than 20.000 known bioactive natural compounds in food working in harmony to sustain health and performance.⁵⁰⁻⁵² **The overfocus on carb-loading or protein supplementation should be abandoned. A focus on a wide variety of whole foods for optimal nutrition and well-being is warranted.**

“At some point, it is also important to recognize a holistic nutrition framework where there is interplay between environmental considerations, physical activity and exercise patterns, dietary patterns, protein foods, and nutrients (amino acids) that cultivates into the overall dietary advice.”⁵³

“There are more than 20.0000 known bioactive natural compounds in food, working in harmony to sustain health and performance. The overfocus on macronutrients should be abandoned. A focus on a wide variety of whole foods for optimal nutrition and wellbeing is warranted.”

4. NEED FOR METABOLIC FLEXIBILITY Metabolic flexibility is the ability to respond or adapt to conditional changes in metabolic demand. Put simply, if you can, or can not easily switch from burning carbohydrates to fat as fuel for performance. There is enough evidence to say this is a **key concept in health**, as metabolic inflexibility, partly due to overeating, is associated with conditions such as type 2 diabetes, high blood pressure, obesity and cancer.^{54,55} Also, there is evidence stating that better metabolic flexibility is related with enhanced mitochondrial performance,⁵⁶ and we really want these powerhouses to work at their max capacity, because they regulate our cellular respiration. Surely, there is something to say to rely on carbohydrates for maximal performance,⁵⁷ but we really want **long-term nutrition strategies where high performance goes hand in hand with good health.**

Just tell me already! Should I go high-carb or full keto for performance?

There are fair arguments both in favor of low carb performance^{91,92} and of carb-loading⁹³. An Individualized approach to fuel availability during training, allowing the athlete to prepare for competition performance with metabolic flexibility and optimal utilization of all muscle substrates seems to be the best way to go.⁹⁴

Again, where all experts do agree upon, is that everyone should minimize processed foods and added sugars.

ANTI-INFLAMMATORY FOOD PRINCIPLES To date, there is good evidence that some ingredients have pro- or anti-inflammatory effects.⁵⁸ In addition, recent literature has shown a link between diet and microbiome changes. Both diet and the gut microbiome are linked to circulating metabolites that may modulate inflammation.^{25,59}

Lower the omega6/3 PUFA ratio to 2:1 & increase MUFA
High intake of prebiotics & probiotics
Decrease intake of pro-inflammatory FA such as trans-FA & saturated FA (present in dairy products, red meat & processed food)
Help digestion of large proteins in the gut & avoid unnecessary fermentation (e.g. increase fiber intake)
Condiment with anti-inflammatory spices
Reduce consumption of gluten (do not eliminate if not celiac)
Increase intake of antioxidants, phytochemicals, vitamins & flavonoids
All references & meal propositions are summarized in the article of Bustamante MF et al., 2020.⁵⁸

Some convenient anti-inflammatory foods to include and to avoid

Foods to include
Beans – peas, lentils, soybeans
Greens – dark leafy vegetables, such as spinach, cabbage, or beetroot
Fruits – Blueberry, cherry, strawberry, pineapple, apple
Grains – unrefined grains, brown rice or oatmeal
Nuts & seeds – hempseed, flax- or chia seed, almonds
Herbs – Curcuma, ginger
Healthy fats – avocado, fatty fish

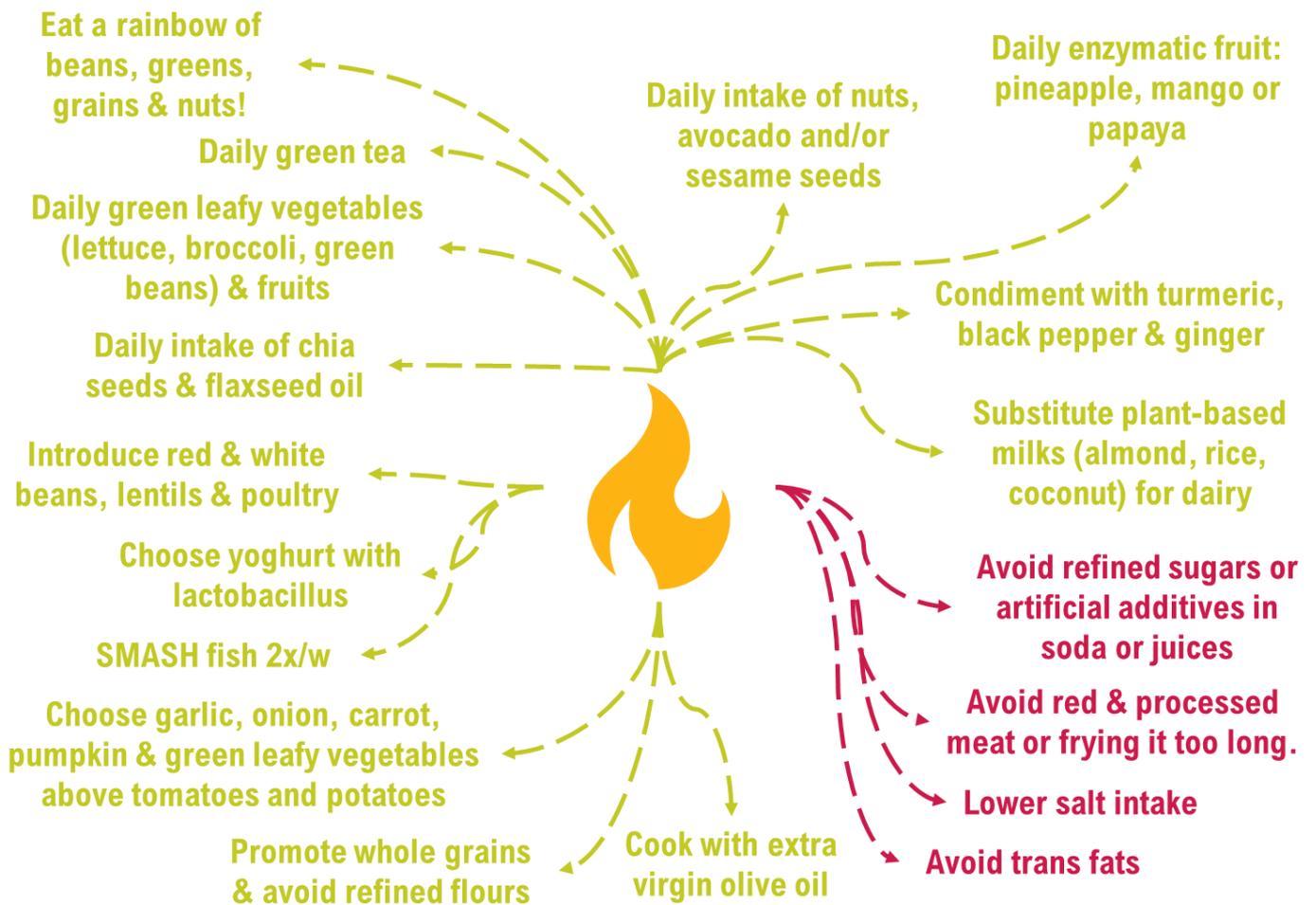
Foods to avoid
Added sugar, refined grains, processed meat, processed food, trans fats, refined oils.



Focus on whole foods that combat inflammation, including those rich in antioxidants and omega-3's.

Anti-inflammatory diet: overview

Summarized in the article of Bustamante MF et al., 2020⁵⁸



V. Awaken the beast, but first: Sleep.

Restorative **sleep seems to have profound effects on** the body's response to **inflammation**.^{60,61} Also, lack of sleep prompts the sympathetic nervous system into overdrive, provoking an unnecessary and sustained inflammation response from the immune system.^{62,63}

“If you make sleep a low priority, you'll create a storm of inflammation and subsequent health problems.”

SLEEP HYGIENE GUIDE FOR ATHLETES

Sleep is, or should be, a **crucial part of your training regime**. It has not only a big impact on **performance**, wins, and losses,⁶⁴ but is also associated with **injuries**.^{65,66} It has become clear that both the quality and quantity of sleep is important in both performance and health.

CIRCADIAN RHYTHMS

Circadian rhythms are your built-in time-regulators that signal your body and brain that it's time to sleep, or to be awake. Living in synchronization with these rhythms is important for your health and wellbeing.⁶⁷ These body clocks impact both physical and mental performance.⁶⁸⁻⁷⁰

LIGHT

Periodic, well-timed exposure to light seems to be the best way to synchronize these sleep/wake cycles.^{71,72} Natural morning light exposure has been shown to have a beneficial impact on sleep timing, duration and quality. Be aware that bright morning light sets your biological clock, which is a good thing. Yet exposure to (bright) artificial light in the evening hours is associated with reduced evening sleepiness, melatonin secretion as well as next-morning alertness and disruption of the biological clock.⁷²⁻⁷⁶ Therefore, choose 'warmer', more amber-colored lamps or candles low to the ground, as these don't seem to have such a negative impact on your sleep.⁷⁷

Light guide for sleep

Natural light in the morning & during the day: go for a morning walk.

Dim the lights in the hours leading up to bedtime, choose amber-colored, warmer lights or candles.

Dark nights.



Useful tools

F.lux app: this is an app for your computer that changes the color of your display, depending on location and time of day to automatically adjust to emit less harmful blue light at light.

Sunrise Simulation Alarm Clock: we want to limit exposure to light before bed, but sunlight naturally helps signal our spike of cortisol in the morning. This clock lights up, simulating the sunrise before your alarm goes off to help wake you up naturally and refreshed.⁹⁵

EATING WINDOW The timing of your meals also impacts your circadian rhythms.⁷⁸ A regular and short eating window, and limiting late night dinners might be a good idea to improve your sleep quality.⁷⁹ Again, there are great interindividual differences, but in the general population, data shows there is a correlation between short sleep duration, late dinners and obesity and diabetes type 2.^{80,81}

THE POWER OF A POWERNAP A powernap can boost cognitive ability, subjective alertness and fatigue.^{82,83} Try to keep it between 20-30 minutes and make sure to avoid afternoon napping, because this can negatively impact your homeostatic sleep pressure (adenosine build-up).

BEDROOM ENVIRONMENT Creating the right environment can make the difference in getting a good night's sleep. Make sure your bedroom is like a sleep sanctuary: Choose soothing colors, no distractions, no e-devices and colder temperature (18°C). Again, limit light exposure about an hour before you go to sleep. This helps your natural melatonin production, which conducts the sleep orchestra of your body.

Short sleep hygiene guide

Regularity (in wake-up timing), also in the weekends.

Use caffeine as a performance boost in the morning or at noon, not in the afternoon.

Powernaps before 4PM, no longer than 30 minutes.

Eat during a time-window of 10 hours/day, limit late-night dinners

Wind down before bed-time, creating bed-time routines can help.

Sleep in a quiet, dark, cool bedroom

VI. Food is a real art: The science behind the anti-inflammatory properties of eating by the rainbow.

There is an abundance of **research pointing to anti-inflammatory compounds in foods**, and experts suggest there may be other yet-to-be-discovered phytonutrients to be found in natural foods. This indicates that a **Rainbow of 'Beans, Greens, Grains & Nuts'-sources** should comprise the bulk of the overall athlete's diet, and especially be of **major importance for athletes trying to combat inflammation**.

Eating is a real art. Each color provides various health benefits and no one color is superior to another, which is why a balance of all colors is most important.

THE RAINBOW Deep down, we all know our grandmother was right when she told us to eat our vegetables. But in general, our daily intake of fruits and vegetables continue to be below recommendations. It might encourage you to know that each individual food has numerous effects based on its color. Indeed, foods contain **phytonutrients**, compounds that **give plants their color, taste and aromas**. 'Eating the colours of the rainbow' really is a science-based concept for health,⁸⁴ and it's actually funny to aim for as many different colors possible when you're cooking a meal!

Paint a beautiful picture of health^{84,85}

Green – Cancer-blocking

Sulforaphane, isocyanate and indoles – Spinach, avocados, asparagus, artichokes, broccoli, kale, cabbage, Brussels sprouts, kiwi fruit, green tea, green herbs (mint, rosemary, sage, thyme, and basil).

Red – Anti-inflammatory & heart health

Carotenoids (lycopene & astaxanthin) – Strawberries, cranberries, raspberries, tomatoes, cherries, apples, beets, watermelon, red peppers.

Orange & yellow – reproduction & heart health

Carotenoids, beta cryptoxanthin – Carrots, sweet potatoes, yellow peppers, oranges, bananas, pineapple, mango, pumpkin, apricots, (butternut, acorn), peaches, corn.

Blue & purple – Anti ageing & cognition

Resveratrol, flavanols, phenolic acid – blueberries, blackberries, elderberries, raisins, eggplant, plums, figs, prunes, lavender, purple cabbage.

White & brown – Cancer-blocking

Allicin, beta-glucan, quercetin – Onions, cauliflower, garlic, leeks, parsnips, radish, mushrooms

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