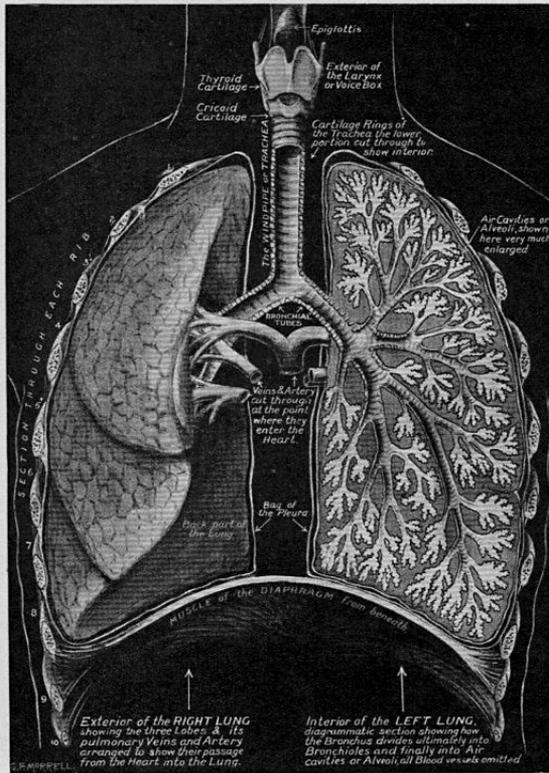


HERE COMES EVERY BREATH YOU BREATHE



THE LUNGS, SHOWN AS THEY ARE AND ALSO IN SECTION

In this picture-diagram the front wall of the chest has been removed, so that the two lungs and their connections are seen. The windpipe is shown dividing into the two bronchial tubes, and a section through the left lung reveals the left bronchial tube dividing and finally ending in the air cells. The right lung, which is not shown in section, is seen to be divided into three parts, or lobes. The diaphragm is also represented, and the great lung artery and veins.

1319

Resistance Medicine for Respiratory Conditions

by Akiima Nicholls Shields

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Sanctum of the Craft

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Intro

Humans have been using plant-based medicines to treat sicknesses and diseases since before there was written language.

In the modern day, plant-based medicine can take the form of ingestion of the whole or part of the plant, taking an infusion or extract, or making use of an isolated phytochemical. Phytochemicals are naturally occurring chemical compounds found in plants, which may be either primary or secondary metabolites. Some of the isolated phytochemicals in use right now for the treatment of someone who is sick with a respiratory ailment (common cold, influenza, respiratory syncytial virus, COVID-19, etc.) include salicylic acid (isolated from willow trees, *Salix* spp.) and quercetin.

Some natural products have been tested in clinical settings and demonstrated significant efficacy in the treatment of acute and chronic disorders of the lungs.

This guide is going to focus on viral respiratory infections (VRI), which are among the most common human illnesses. These include the common cold (rhinovirus), acute bronchitis, influenza, COVID-19, and respiratory syncytial virus. However, this class will also touch on the prevention of pneumonia, which can be caused by a virus, but also by bacteria and fungi.

While some of the common respiratory viruses have effective vaccines that are available and recommended for use each year, they have unfortunately low levels of uptake in the general population of the United States.

Some plant-based materials are used in preventative treatment, which aims to prevent a person from being infected by a respiratory virus at all

or which aims to reduce the severity and longevity of a respiratory virus if a person becomes infected at some point.

Some conventional treatments, plant-based or otherwise, for respiratory problems are symptomatic. Symptomatic treatment provides relief from illness symptoms, but does not address the underlying cause, such as taking a cough suppressant for a cough caused by a virus.

Some conventional treatments, plant-based or otherwise, are curative. Curative treatment attempts to eliminate the condition, ailment, syndrome, disorder, or disease and promote recovery. This would be like taking an antiviral for a respiratory virus.

The administration of plant-based medicine may be through ingestion as a regular part of diet, ingestion via medicine (hot water infusion; tincture; cough syrup and drops; capsules), topical application (inhalation of steam; application of salve), or injection (far more common with isolated phytochemicals in an allopathic medical setting).

It is important to remember several things:

This class is intended to teach herbalists and medics who do not have the legal or ethical right to diagnose or claim to treat, cure, or prevent any sickness, condition, ailment, disorder, or disease.

Just because these are plant-based medicines does not mean that they are automatically safe. All of the plant-based medicines that follow have contraindications, adverse effects, and side effects.

Any action a plant has on the body is contraindicated for someone.

Prevention

Hand washing

Hand hygiene is simple, low-cost, and contributes to substantial effects in suppressing acute respiratory infection epidemics. A review of studies on hand washing (Mo, Yin et al., 2022) found that a single hand hygiene event (washing with soap and water or using hand sanitizer) decreased the daily probability of an acute respiratory infection by 3 percent.

Hand washing is especially indicated for SARS-CoV-2 (COVID-19) and influenza, as they are enveloped viruses, which means they are surrounded by a viral envelope made of lipids, which protects the virus when it is outside of a host cell and anchors the different structural proteins needed by the virus to infect cells. This envelope is best destroyed by a combination of friction, soap, and water. Hand sanitizer is also effective against both, as it destroys the envelope.

The question of “when” and “how often” the public should wash their hands to affect infection risk still hasn’t been authoritatively answered. The aforementioned meta-regression analysis found the relative risk for daily probability of acquiring a respiratory tract infection was 0.97 and reduced by 3 percent with each hand washing, but the review had a high degree of uncertainty.

A different study found that correct and frequent hand washing amongst a group of people can reduce the number of outpatient visits to allopathic physicians for a respiratory illness by 45 percent.

Hand washing education in schools has been found to result in up to a 50 percent reduction in sick days.

There must be a dose-response relationship between hand hygiene frequency and decreased rate of infections. At least one study has found that the benefits of hand hygiene do not maximize by washing one's hands every hour.

There is a complex relationship between hand washing and risk of infection, partially due to the fact that not all viruses last on the hands the same amount of time. Some viruses do not last on the hands for very long, so washing one's hands once in the middle of the day may not affect transmission risk at all. Droplets of respiratory secretions containing influenza only last on human finger tips for about five minutes.

Instead of telling people to "wash their hands often", which is unclear, may not be effective, and often isn't actually followed, it may be better to tell people to wash their hands if they feel they may have been exposed to a virus or bacteria. This would include after exposure to someone with symptoms (being around someone coughing or sneezing), after touching contaminated surfaces, after handling raw meat, etc.

Additionally, people often do not wash their hands correctly. Even people who self-reported that they washed their hands frequently (at least four times a day) or after touching a contaminated surface (about two-thirds of people) during outbreaks of respiratory viruses may not have done so correctly, thus influencing the data on whether hand washing is effective at reducing infection risk.

Only about five percent of people wash their hands for the recommended 20 seconds. Less than half of all Americans use soap when they wash their hands. Only 66 percent of Americans wash their hands after using a restroom at all, with only 60 percent of self-identified men saying they wash their hands after using the restroom.

If everyone correctly washed their hands multiple times a day, an estimated one million deaths could be prevented a year. (National Foundation for Infectious Diseases)

Hands should be washed before, during, and after preparing food, before and after eating food, after being exposed to someone with the signs and symptoms of illness, after being in an environment with a sick person where surfaces were touched, before caring for someone who is sick, before and after treating a wound, after using the toilet, after changing diapers or cleaning up after a person who has used the toilet, after cleaning the toilet, after cleaning the kitchen, after cleaning up pet feces, after touching animals, after touching garbage, and after touching surfaces in crowded environments (schools, malls, shopping centers, etc.)

Hands should be wet with clean, running water (warm or cold doesn't matter).

The tap should be turned off.

The person should apply soap and lather by rubbing the backs of their hands, their palms, between their fingers, under their nails, and up their wrists for a minimum of 20 seconds (mentally sing the Happy Birthday song twice).

They should then rinse their hands with clean, running water.

They should then dry their hands using a towel, not an air dryer. Air dryers spread bacteria and viruses.

If a person cannot wash their hands, they can use alcohol-based hand sanitizer that contains at least 60% alcohol.

Masking

Wearing a mask can lower the risk of transmission of respiratory viruses in community settings, especially influenza and COVID-19.

Unfortunately, using a mask within a family group one to three days after someone has become infected with a respiratory virus did not appear to prevent transmission to family members, whether

or not the masks were used by the sick person, the healthy family members, or both.

N95 masks have been found to be superior to cloth and surgical masks at preventing viral respiratory tract infections.

Diet

There is a direct relationship between nutritional status and immune response to viral respiratory infections. Malnutrition suppresses the immune response and increases the susceptibility to infections.

Food choices affect how the body responds to viruses. Food choices may not prevent someone from being infected, but they can impact the length and severity of infections.

Inflammation is a critical part of how respiratory viruses impact a person's body, especially COVID-19. The release of inflammatory cytokines can cause what is referred to as a "cytokine storm", an immune dysregulation that is a life-threatening complication associated with increased risk of acute respiratory distress syndrome (ARDS). The damage the virus causes is exacerbated by this inflammatory immune response, which can damage or destroy organs, including the lungs, kidneys, heart, and liver. (Mahmudpour et al. 2020, Tzotzos et al. 2020)

Inhibition of pro-inflammatory cytokines may be a vital strategy to save the lives of those infected with COVID-19 (Cheng et al. 2020; Mahmudpour et al. 2020)

It is important for the immune response to be balanced - present to protect the body from foreign microbes, but not overly aggressive and inflammatory.

"This immune system defence ability can be programmed through epigenetic and metabolic programming of the innate response, which modulates the effector immunity. These changes can

lead to responses with qualitative and quantitative adjustments, consequently reducing the risk of secondary infections and other diseases related to a reduction in the immune system activity.”

The standard model of American life consists of a very unhealthy amount of stress, sleep deprivation, and an inadequate, unbalanced diet that does not contain the proper amount of macro and micro nutrients. Most Americans exist in a chronic low-inflammation status, which negatively impacts the immune system.

Threats to food security, like poor socioeconomic status, directly impact the spread and severity of disease in a community.

Anti-inflammatory diets are associated with helping the body to prevent and combat infections and modulate the severity and duration of infection. Infection can also worsen nutrition, with malnutrition caused by the infection then decreasing resistance to the infection, in a vicious cycle.

In the vicious cycle, infections induce inflammation, which generates fever, appetite loss, and alters intestinal absorption. The body then doesn't get the fuel it needs to fight infection, as the sickness induces or worsens malnutrition. That malnutrition then increases the risk of the infection spreading in the body, partially due to reduced gut barrier function and the modification of the microbiome. That then compromises immune cell generation and activation and alters the body's inflammatory response, which makes the appetite loss and intestinal absorption worse, and so on in a circle.

Starvation diets also increase the risk of respiratory tract infections and their severity. Undernutrition alters immune response and also increases the secretion of inflammatory cytokines, as well as increasing the production of stress hormones, such as cortisol, which limit the ability of immune cells to respond appropriately to infection.

Fighting infection creates a high metabolic need - meaning that the body needs fuel to fight. If the fuel is restricted, the fight is compromised.

Some studies may even suggest that malnutrition may facilitate the development of variants of respiratory viruses that are more contagious and deadly.

Undernourished children have the highest risk of severe disease from respiratory tract infections. Severe medical obesity also increases the risk of acute respiratory distress syndrome, a life-threatening condition that causes widespread inflammation in the lungs, leading to fluid accumulation and difficulty breathing, which can be caused by any of the respiratory viruses.

People who are undernourished, malnourished, and who are severely medically obese are more susceptible to severe forms of COVID-19. People with hypertension and type 2 diabetes are also more likely to suffer from critical complications from COVID-19, and both of those conditions are influenced by diet.

One reason the elderly are so impacted by respiratory viruses is that they are often malnourished.

Some foods and dietary patterns have been identified as worsening inflammation, worsening oxidative stress, and worsening the immune system's response to infection.

Oxidative stress is an imbalance of free radicals and antioxidants in the body that leads to cell damage, which can damage the immune system. Oxidative stress causes the body to respond poorly to respiratory tract infections, and then respiratory viruses increase oxidative stress marker levels and also impair cellular defense mechanisms against oxidative stressors, in another vicious cycle.

The foods that cause the worst effects were refined sugars, hydrogenated fats, and ultra-processed foods. These foods are extremely present in the American diet.

Several diets with anti-inflammatory characteristics have been associated with improved health outcomes for respiratory tract infections. These diets actively protect the body from inflammation,

infection and modulate the severity and duration of infections.

The best diets for managing respiratory tract infections and diseases have been found to be the Mediterranean Diet, Dietary Approaches to Stop Hypertension, and Harvard Healthy Eating Plate.

Looking at what they have in common, they focus on unprocessed and minimally processed food, including fresh produce, fish, and whole grains.

Micronutrients

Micronutrients play an important role in the immune response to respiratory tract infections. Micronutrients are nutrients required by the body in small amounts to support growth, development, and maintain optimal health, including vitamins and minerals.

Vitamin D:

Vitamin D (also referred to as calciferol) is a fat-soluble vitamin that is naturally present in a few foods, but also produced endogenously when ultraviolet (UV) rays from sunlight strike the skin and trigger vitamin D synthesis. Vitamin D supports immune function, muscle strength, brain cell health, and cell growth, and is vital for the absorption of calcium, which is needed for bone health. It is a potent anti-inflammatory.

Recent data shows that over 60 percent of Americans have insufficient or deficient levels of Vitamin D.

Vitamin D insufficiency has been associated with greater wheezing in asthma in both children and adults.

Studies in North America have found that supplementation with Vitamin D leads to a significant reduction of respiratory tract infections, but intriguingly, that same significant effect was not found in studies performed in Europe or Oceania.

Supplementation with Vitamin D has also been found to make tuberculosis treatment more effective and recovery faster.

Low Vitamin D levels in winter have been theorized to contribute to the frequency of influenza and rhinovirus outbreaks during that period.

Low vitamin D status is associated with so many diseases that dietary supplementation might be a cost-effective measure to improve the general health of the population, especially in those who cannot get adequate access to sunlight in their daily lives.

Food sources of Vitamin D:

Few foods are naturally rich in Vitamin D. This is one reason supplementation may be necessary.

Fungi (mushrooms, especially if they have been fortified by exposure to ultraviolet light)

Vitamin D fortified foods (dairy, cereals, orange juice, sunflower oil)

Fish (salmon, swordfish, tuna, sardines, cod liver oil)

Meat (beef liver)

Egg yolks

Vitamin A:

Vitamin A is an essential fat-soluble nutrient that supports immune function, healthy skin and mucous membranes, and vision.

People with Vitamin A deficiencies, especially children, are more likely to be infected with respiratory viruses compared with the general population and more likely to develop serious respiratory illnesses, including otitis media, sinusitis, or pneumonia, than those with nonrecurrent respiratory diseases. Children with low Vitamin A levels are more likely to die from respiratory tract infections than children without that malnutrition.

Supplementation with high, repeated dosage with Vitamin A has been found to have a small

decrease incidence of respiratory tract infection in children, but it appears likely it is more important to have a diet rich in Vitamin A than to rely on supplementation.

Dietary sources for Vitamin A include:

Eggs

Dairy products (milk, cheese, yogurt)

Fish (mackerel, salmon, cod, tuna)

Liver (beef, chicken, pork)

Vegetables (spinach, sweet potatoes, carrots)

Legumes (lentils, black eyed peas)

Fruits (mangoes, apricots, cantaloupe)

Nuts and seeds (pumpkin seeds, almonds)

Vitamin C:

Vitamin C, also known as ascorbic acid, is an essential water-soluble vitamin that is an antioxidant, supports immune system function, and aids in the absorption of other vital nutrients and micronutrients, including iron.

Smokers with higher dietary vitamin C intake don't cough and wheeze as much as smokers who have lower intake of vitamin C, which may be due to its potent antioxidant action.

Some studies have found that Vitamin C supplementation doesn't reduce symptoms of rhinovirus (common cold) infection, while others have found that it does (at 80 milligrams daily).

Adequate vitamin C levels were also essential in preventing COVID-19, as well as in the treatment of people who have it. Both adequate dietary amounts of Vitamin C and supplementation may be helpful.

Early intervention in severe COVID-19 cases with intravenous or oral Vitamin C at high doses has been used to reduce the severity and duration of infection without observed adverse effects. (Cheng R; 2020)

Food sources for Vitamin C include:

Vegetables (peppers, broccoli, brussels sprouts, cauliflower, potatoes, tomatoes, spinach, kale, and cabbage)

Fruits (strawberries, mangos, lemons, citrus fruits)

Fortified breakfast cereals

Fortified grains

Fortified potato products

Vitamin E:

Vitamin E is the collective name for a group of fat-soluble compounds. They are all antioxidants that play a role in immune function and are anti-inflammatory. They also serve important roles in nerve and cognitive health, healthy skin and eyes, and absorption of Vitamin K.

Sufficient levels of Vitamin E cause decreased mortality from respiratory disease.

One trial performed on elderly nursing home residents found that those who took 200 IU of vitamin E daily had a lower incidence of the common cold and contracted fewer upper respiratory tract infections over the course of a year.

Dietary sources of Vitamin E include:

Vegetable oils (wheat germ oil, soy, corn, sunflower)

Seeds (sunflower)

Nuts (almonds, hazelnuts, and peanuts)

Fruits (avocados, mangoes, kiwis)

Vegetables (tomatoes, spinach, broccoli)

Fortified grains

Eggs

Meat (tuna)

Iron:

Iron is a mineral that the body needs for growth, development, and to have a healthy immune system. It also uses iron to make hemoglobin, a protein in red blood cells that carries oxygen from the lungs to the rest of the body, and myoglobin, which provides oxygen to muscles. The body also needs iron to make hormones.

Iron deficiency is common worldwide, especially amongst disadvantaged socioeconomic classes.

Iron deficiency anemia increases the risk and severity of respiratory tract infections, especially in very young children.

Iron deficiency makes people more likely to get infections, not just respiratory tract infections, but all infections.

Food Sources of Iron:

Red meat (beef, pork, lamb)

Poultry (chicken, turkey)

Seafood (oysters, clams, mussels)

Eggs

Legumes (beans, lentils, chickpeas)

Nuts and seeds (cashews, almonds, pumpkin seeds)

Dark leafy green vegetables (spinach, kale, collard greens)

Fortified cereals and grains

Fruits (raisins, prunes)

Molasses

Dark chocolate

Fermented foods (tofu, tempeh)

Zinc:

Zinc is an important non-metabolite that is a cofactor for over two hundred enzymes in the human body. It plays a direct role in RNA, DNA, and protein synthesis. It is essential for immune function and is involved in both the development and maintenance of immune cells. It is essential for anabolic and energy metabolism. It also modulates inflammation. Zinc deficiency in growing humans disrupts growth.

Approximately half of the world's population has a zinc-deficient diet. As zinc is a required cofactor for an enzyme that synthesizes the heme portion of hemoglobin, severely zinc-deficient individuals will also develop anemia.

Zinc supplementation has been shown to have a positive impact on pneumonia.

Zinc supplementation also reduces the number of common colds (rhinovirus).

Food sources of zinc include:

Nuts (cashews, peanuts)

Seeds (sesame, pumpkin)

Legumes (chickpeas, lentils, beans)

Eggs

Meat (lamb, red meat, poultry)

Fish (shellfish)

Vegetables (dark, leafy greens)

Dark chocolate

Selenium:

Selenium is an essential non-metabolite that is an essential component of various enzymes and proteins, called selenoproteins, that help to make DNA and protect against cell damage and infections. The proteins are also involved in reproduction and the metabolism of thyroid hormones.

A lack of selenium compromises the immune system and also causes the symptoms of iodine deficiency. Too much selenium can also cause selenium poisoning.

A diet that contains sufficient selenium has been found to cause lower rates of COVID-19 infections as well as less severity and faster recovery from COVID-19.

Supplementation with 50 to 100 micrograms per day as a provisional daily dosage has been found to help prevent infection with both influenza and coronavirus viruses, including the daily Selenium recommendation, which is 50 micrograms.

Dietary sources of Selenium include:

Meat (pork, poultry, beef)

Fish (especially yellowfin tuna, but also sardines and shrimp)

Eggs

Dairy (especially cottage cheese)

Whole or enriched grains

Some nuts (Brazil nuts especially, but cashews and pistachios to a lesser extent)

Sorrel

Mushrooms

Fatty acids:

Fatty acids are important dietary sources of fuel for animals and important structural components for cells. Vitamin F is not a traditional vitamin but a term for two fats: alpha-linolenic acid (ALA) and linoleic acid (LA). It is an essential fatty acid used by the body to build and maintain membrane structures.

Human bodies can make almost all of the fatty acids needed, with exceptions: omega-3 fatty acids, linoleic acid, linolenic acid, gamolenic acid, and cis-6, cis-9, and cis-12-octadecatrienoic acids, and the omega-6 fatty acid gamma-linolenic acid. These fatty acids are therefore essential in the diet. Plants can synthesize linoleic and linolenic acid from

precursors in their systems, so humans need to acquire them by eating plants that contain them or the meat from animals that have consumed those plant fats themselves.

Gamma-linolenic acid is an omega-6 fatty acid that enhances immune function, decreases inflammation, and is essential for neurological function.

Alpha-Linolenic acid is an omega-3 fatty acid. The metabolites of alpha-linolenic acid may also inhibit the production of pro-inflammatory cytokines.

A study performed on newborns found that infants who were fed the formula supplemented with two fatty acids, docosahexaenoic acid (an omega-3 fatty acid) and arachidonic acid (an omega-6 fatty acid), in the first year of life developed fewer respiratory tract infections. Too much arachidonic acid can be a problem, especially in elderly adults, as it can generate inflammation and cause more inflammatory cytokines. However, in infants and young children, it is more desirable.

Two other studies performed on older children have found that children who have sufficient levels of alpha-linoleic acid, linoleic acid, and eicosatetraenoic acid (an omega-3 fatty acid) had reduced rates of infection with respiratory tract viruses.

Food sources of gamma-linolenic acid include:

Nuts

Seeds

Legumes

Eggs

Plant oils (black currant oil, evening primrose oil)

Food sources of alpha-linolenic acid include:

Nuts

Seeds

Oils (flax oil, linseed oil)

Legumes

Fatty fish

Dark green vegetables

Eggs

Supplement sources of alpha-linolenic acid include:

Fish oil supplements

Food sources of docosahexaenoic acid include:

Fatty Fish (salmon, mackerel, sardines, tuna, trout, and anchovies)

Eggs

Dairy products (milk, especially from grass-fed cows, and yogurt)

Marine algae oils (algal oil)

Chia seeds

Walnuts

Supplement sources of docosahexaenoic acid include:

Fish oil supplements

Food sources of arachidonic acid include:

Meat (beef, chicken)

Eggs

Full-fat dairy

Food sources of eicosapentaenoic acid include:

Oily fish (mackerel, herring, trout, salmon)

White fish (cod, haddock)

Marine algae oil (algal oil)

Eggs from Omega-3-enriched chickens

Supplement sources of eicosapentaenoic acid include:

Fish oil supplements

Flavonoids:

Flavonoids are the largest, most common, and most diverse group of polyphenolic compounds in the human diet. Flavonoids are the largest, most diverse group of phenols, including more than 6000 compounds, all of which share a common structure. Flavonoids include chalcones, flavones, flavonols, flavanolols, flavanones, isoflavonoids, isoflavones, flavan-3-ols, catechins, and anthocyanins. The most common of these are anthocyanins, flavones, and flavonols.

Flavonoids are found widely distributed in higher plants, mostly in leaves and flowers. They are water-soluble. The colors of plants are based on what kind of flavonoids they possess. Yellow, orange, blue, and red, and the combinations thereof, all come from flavonoids. Although flavonoids are responsible for most plant pigments, pigments may also come from betalain alkaloids (This occurs in species in the Phytolaccaceae and Cactaceae families.)

The widespread distribution of flavonoids and their tolerability mean that humans who ingest enough produce get a fair amount of them in their diet.

There isn't an established minimum recommended intake of flavonoids in the diet; however, there are symptoms of deficiency that are widespread in America due to the American diet being lacking in fresh produce.

“[The] CDC used the most recent 2019 Behavioral Risk Factor Surveillance System (BRFSS) data to estimate the percentage of states' adult population who met intake recommendations overall and by sociodemographic characteristics for 49 states and the District of Columbia (DC). Overall, 12.3% of adults met fruit recommendations, ranging from 8.4% in West Virginia to 16.1% in Connecticut, and 10.0% met vegetable recommendations, ranging from 5.6% in Kentucky to 16.0% in Vermont. The prevalence of meeting fruit intake recommendations was highest among Hispanic adults (16.4%) and lowest among males (10.1%); meeting vegetable intake recommendations was highest among adults aged ≥ 51 years (12.5%) and lowest among those living below or

close to the poverty level (income to poverty ratio [IPR] <1.25) (6.8%).” (Lee SH, Moore LV, Park S, Harris DM, Blanck HM. Adults Meeting Fruit and Vegetable Intake Recommendations — United States, 2019. *MMWR Morb Mortal Wkly Rep* 2022;71:1–9.)

Adults in higher income brackets consume the most flavonoids.

Flavonoids reduce the incidence and severity of respiratory tract infections because they are anti-viral, anti-inflammatory, anti-oxidant, anti-proliferative, and anti-replicative against viruses.

Many flavonoids have been identified as potential inhibitors of SARS-CoV-2. Naringenin, hesperidin, neo-hesperidin, quercetin, cyanidin, rutin, kaempferol, hesperetin, myricetin, caflanone, baicalin, luteolin-7-glucoside, apigenin-7-glucoside, naringenin, catechin, epigallocatechin, icariin, herbacetin, rhoifolin, pectolinarin, and genistein have been the most effective.

Quercetin has displayed significant inhibitory activity against COVID-19, especially when co-administered with vitamin C. They can be employed on their own or in combination with standard treatment to improve COVID-19 treatment in high-risk populations (Colunga Biancatelli et al., 2020)

Cyanidin and genistein have a binding effect on COVID-19 compared to the standard drugs Nelfinavir and Lopinavir (Pendyala and Patras 2020).

Baicalin was comparably binding to a protein in COVID-19 (S protein) as the drugs abacavir and hydroxychloroquine. Baicalin was also reported to have antiviral activity against other viral infections (Pandey et al. 2021).

As aforementioned, severe cases of COVID-19 are dangerous, partially because of the risk of developing a cytokine storm. Flavonoids are immunomodulatory and anti-inflammatory and can help prevent cytokine storms.

The most important flavonoids for immunomodulation include:

Naringenin, which exhibits promising immunomodulatory activity that reduces the severity of inflammatory responses (Tutunchi et al. 2020). It reduces the amount of inflammatory cytokines, as well (Fouad et al. 2016).

Hesperitin reduces inflammation (Yoshida et al. 2010), increases protection against acute lung injury (Ma et al. 2015), and reduces inflammatory cytokines (Ma et al. 2015).

Quercetin also inhibited airway inflammation (Park et al. 2009), similar to dexamethasone, in mice trials (Rogerio et al. 2010) and in humans in clinical trials.

Quercetin has also been found to reduce oxidative stress, cell death, and fibrosis (a condition where the lungs become permanently scarred and thickened, making it harder to breathe) in COVID-19 patients, but also protects the lungs from damage from other causes, such as smoke inhalation. (Ma Huang et al. 2024)

Quercetin also shows proactive activity against pneumonia, even obstructing pneumonia induced by *Streptococcus pneumoniae*. (Ma Huang et al. 2024)

Quercetin, of all the flavonoids, has the highest number of beneficial mechanisms of action against COVID-19.

As stated, flavonoids are diverse. How they are absorbed, distributed in the body, and metabolized can influence their efficacy (Miranda et al. 2012). Different sources are more or less bioavailable. This might hinder oral absorption, but some research is finding that nano-formulations and microemulsions may improve bioavailability in allopathic clinical settings. This isn't as relevant to herbalists or street medics, but still good to know.

Dietary sources of Flavonoids:

Yellow onions have the highest amount of flavanols, including quercetin, kaempferol, and

myricetin, up to 1.2 grams per kilogram of fresh weight.

Curly kale contains up to 0.6 grams of flavanols per kilogram of fresh weight.

Leeks, cherry tomatoes, broccoli, and blueberries all contain moderate levels of the same (Between 0.1 gram and 0.225 grams per kilogram of fresh weight) (Manach et al. 2004)

The flavones apigenin and luteolin are the most present in parsley, celery, peppers, and black pepper. Flavanones (including hesperidin, naringenin, and eriodictiol) are the most present in tomatoes, oranges, grapefruits, and lemons. (Manach et al. 2004)

The most common and richest concentration of flavonoids is in citrus fruits, black tea, and green tea (Manach et al. 2004). The dietary impact of all three has been found to decrease incidences of respiratory tract infection and improve treatment of the same.

Flavonoid concentration in plants changes in response to environmental conditions, including temperature, light duration, light intensity, watering, nutrients in soil, etc.

Quercetin, Vitamin C, and Bromelain:

In one study, a combination of quercetin, Vitamin C, and bromelain (more on this later in the section on pineapple juice) was given to patients with respiratory infections. It increased the bioavailability of quercetin significantly. Both Vitamin C and bromelain, on their own, can improve the oral bioavailability of quercetin by up to 80 percent. The combination showed no adverse effects in the participants and prevented the dysregulation that comes from COVID-19 and can cause cytokine storms. (Hasan et al, 2021)

In the trial, this was combined with the standard treatment regimen of hydroxychloroquine, 400 mg daily for another 5 days, and favipiravir, 2 × 600 mg for 4 days following a 2 × 1600 mg loading dose on day one. More studies need to be performed as to whether supplementation is effective without standard drug treatment and at what dosage. (Hasan et al, 2021)

Probiotics:

Multiple studies have found that probiotics in a diet reduced the incidence rate (number of cases per person per year) of respiratory tract infections in children, adults, and the elderly.

In the studies, children were more likely to obtain probiotics from consuming dairy products like yogurt, adults were more likely to consume probiotic powders, and elderly people were more likely to get probiotics from dairy sources and from capsules. Most of the studies focused on one or two strains (*Lactobacillus plantarum* HEAL9 and *Lactobacillus paracasei* (8700:2 or N1115)) at a dose and 109 or 1011 colony-forming units (CFU)/day of probiotics for more than three months.

Adverse effects from probiotics in the study were fairly minor, with some people experiencing some gastrointestinal symptoms, like flatulence. In rare cases, they experienced vomiting, diarrhea, and bowel pain and had to reduce or stop taking the probiotics.

Dietary sources of probiotics:

Fermented dairy (kefir, yogurt, some buttermilk, cheese)

Fermented vegetables (sauerkraut, kimchi, miso, and tempeh)

Fermented yeast (kombucha)

Dark chocolate

Other Foods for Prevention and Treatment:

Cranberry juice:

Cranberry juice may help reduce the frequency of infection and the severity and duration of respiratory infections. This is partially due to its high Vitamin C content. But it is also due to the presence of proanthocyanidins, compounds with antiviral effects against influenza type A and B (which prevents the virus from attaching to cells). It is also due to the presence of anthocyanins, which inhibit the main protease enzyme in SARS-CoV-2.

It also reduces inflammatory cytokines and may help prevent cytokine storms.

It also reduces all the symptoms of respiratory tract infections, specifically rhinovirus, influenza A and B, and COVID-19.

One study found that ingestion of a cranberry supplement significantly improved responses to the standard therapy (Favipiravir 1600 mg twice daily on day 1 and 600 mg twice daily for the next 4 days plus supportive therapy) at doses of 1000 milligram capsule (Cranrx of Nature's Way company – USA) per day for 7 days. The cranberry supplementation reduced the inflammatory response, relieved overall symptoms of COVID-19, and maintained oxygen levels.

Oranges and orange juice:

Orange juice contains antioxidants, micronutrients, and a range of vitamins, minerals, and polyphenols. It is especially high in vitamin C and folate (vital for immune response). Oranges also contain the flavonoids hesperitin, narirutin, and naringin, all of which inhibit inflammation.

“The Nutrient Reference Values for vitamin C and folate are 80 mg and 200 µg, respectively. Typical contents of vitamin C and folate in orange juice are 40 to 50 mg/100 ml and 20 to 40 µg/100 ml, respectively; these are influenced by the type of oranges used for making the juice and how the juice is stored. Nevertheless, it is clear that a serving of 100% orange juice would provide sufficient amounts of both vitamin C and folate to carry a permitted immune claim.”
(Miles et al, 2021)

Consuming orange juice daily for weeks does reduce inflammation.

In vitro studies have found that hesperidin, hesperetin, and naringenin restrict viral replication of COVID-19. However, at what dosage this works with the consumption of normal fruit juice hasn't been established, although clinical trials have been registered to find out.

Pineapple juice and bromelain:

It is misinformation that pineapple (*Ananas comosus*) juice is five times for effective at treating cough than codeine cough syrup. However, it should also be noted that codeine cough syrup is clinically ineffective in studies on both adults and children. It doesn't work.

Pineapple juice may help with coughing due to its anti-inflammatory properties. It can also help with respiratory infections due to its antimicrobial and immune-stimulating properties.

Pineapple juice contains the protease enzyme bromelain, which is only found in pineapples. It exhibits a major effect on reducing mucous, which can reduce the severity of some respiratory tract infections and possibly prevent pneumonia.

There has been a study that found that both honey on its own and honey combined with bromelain showed immediate improvement in coughs. (Décio Medeiros, et al. 2016).

Taking bromelain orally can improve breathing, lessen congestion, lessen coughing, and support recovery from infections such as COVID-19, but that's as an isolated supplement, not as pineapple juice. However, pineapple juice has been found anecdotally to be very soothing on people's throats, and its high Vitamin C content is likely also beneficial.

The research doesn't undermine the experiences of those who have personally found pineapple juice helpful in relieving a cough. It just means that further research is needed to prove it is effective.

Bromelain is also a very effective oral painkiller. Bromelain was comparable to diclofenac in the management of postoperative pain, swelling, and jaw spasm following impacted mandibular third molar surgery (Diclofenac is a nonsteroidal anti-inflammatory drug (NSAID) used to treat mild-to-moderate pain). (Bhoobalakrishnan et al. 2021)

Supplementing with bromelain and curcumin (isolated from turmeric) can interfere with the

key phases of the pathophysiology of COVID-19.
(Chakraborty, Arka, et al. 2021)

Bromelain should not be taken by people who are allergic to pineapple or latex, or things in the daisy family (Asteraceae), including ragweed, Echinacea, chrysanthemums, marigolds, daisies, or by people with allergies to wheat, celery, papain, carrot, fennel, cypress pollen, or grass pollen. It also slows blood clotting, so it should not be used by people with clotting disorders or who are on blood thinners or before surgery.

Turmeric (*Curcuma longa*):

Multiple studies have found that turmeric has a relaxant effect on the smooth muscles of the trachea, a bronchodilatory effect on patients with obstructive pulmonary disease, and a preventative effect on respiratory diseases. It is extremely anti-inflammatory and immunomodulatory, but also influences pathological responses in the lungs, keeping airways more open and responsive. Intriguing, this effect is caused both by the plant itself and the major constituent, curcumin, in isolated form.

Both turmeric and curcumin show major relieving and preventive effects on respiratory disorders. (Baskabady et al. 2020).

The isolated curcumin has been found to prevent the entry of SARS-CoV-2 into human cells. Six studies have found that curcumin supplementation during COVID-19 infections led to a significant decrease in common symptoms, duration of hospitalization, and deaths, and all the studies found that using curcumin supplements ameliorated the cytokine storm effect. (Azimi et al, 2022)

Another study found that combining bromelain with curcumin improved endothelial cell function, oxygen utility capacity, and fatigue in adults with only mild side effects.

Curcumin is effective on its own, according to these studies, but other studies have found that it has fairly low bioavailability on its own. Bioavailability limits its practical application. As a natural bioenhancer, piperine is expected to increase

the bioavailability of curcumin and then enhance its beneficial effects.

Turmeric and curcumin are generally well-tolerated with few adverse effects. High doses can cause stomach upset, nausea, dizziness, or diarrhea, which stop when the person ceases taking it. Curcumin acts as a phytoestrogen, so it shouldn't be taken by people with hormone-sensitive conditions (breast, uterine, ovarian cancer, endometriosis, adenomyosis, uterine fibroids, low testosterone). It can also lower testosterone. It may damage the liver in high doses, so it shouldn't be taken by people with liver conditions. It slows blood clotting, so it should not be used by people with clotting disorders or who are on blood thinners or before surgery.

Ginger:

Ginger (*Zingiber officinale*) is anti-inflammatory, antioxidant, and antiviral. This is due to compounds it contains, including gingerol, zingiberene, and shagoal.

A study found that ginger reduces symptoms of acute respiratory distress. (Mao et al, 2019)

Intriguing, water-based extracts of ginger are still effective at managing respiratory symptoms, rather than requiring isolation of the compounds. Inhalation of the steam of ginger water infusions is also effective at reducing coughing. (Mao et al, 2019)

One study found that people who took ginger supplements orally at a dosage of 1.5 milligrams twice per day while hospitalized with COVID-19 reduced the length of their stay. The effect was more pronounced on self-identified men aged 60 or older and in participants with pre-existing medical complications. (Li et al, 2022)

Ginger is generally well-tolerated with few adverse reactions. It can cause nausea in high doses (though it often relieves nausea at lower doses). It is contraindicated for people with clotting disorders, as it may thin the blood, or for people who are already on blood thinners. It should not be used before surgery. It can also lower blood sugar, so it should be used with caution by those with low blood sugar or who are already on blood sugar affecting medication.

Garlic:

Garlic (*Allium sativum*) has been found effective at reducing the frequency, duration, and severity of upper respiratory tract infections. It enhances immune response and shows antiviral activity, likely due to the compound allicin. (Rouf et al, 2020; Mattieu et al 2018)

Garlic is generally well tolerated. It can cause side effects such as bad breath, heartburn, gas, and diarrhea. High doses can lower blood pressure, so they should be used cautiously with people with low blood pressure or on blood pressure-lowering medications. High doses can also lower blood sugar, so it should be used cautiously for those who have hypoglycemia or who are on blood sugar-affecting medications. High doses may also thin the blood, so they should not be combined with blood thinners or used by people with difficulties that reduce their ability to form blood clots. High doses of garlic should be ceased two weeks before any surgery.

Onions:

Onions (*Allium cepa*) have been found to have antioxidant, anti-inflammatory, immunomodulatory, and antiviral properties. Multiple studies and reviews have confirmed that they reduce symptoms of respiratory tract infections and improve lung function. Onions contain quercetin and fructans, which help fight respiratory tract infections and improve outcomes during and after infection. They also smooth and relax the trachea and bronchial cells. (Beigoli et al, 2021)

A controlled, randomized, and double-blind study conducted with a mixture of garlic and onion extract concentrate demonstrated a significant protective effect on respiratory diseases of infectious origin in elderly healthy volunteers in residential care facilities. There was an overall decrease in the number of events of infectious respiratory diseases, as well as in the number of associated symptoms and their duration. The researchers concluded that regular consumption of an *Allium* extract improves the immunity of elderly volunteers and that it could be used as a preventative

against the most common infectious respiratory diseases.

The active product was Aliocare® (DOMCA SAU., Granada, Spain), which contains concentrated onion extract (86 milligrams) standardized in organosulfur compounds derived from propiin (10 milligrams per capsule), garlic powder (14 milligrams), and microcrystalline cellulose (9892-Capsucel®, Laboratorios Guinama, La Pobla de Vallbona, Valencia, Spain) up to 450 mg. (García-García, et al. 2023)

Relevant Plant Actions

Every plant has a combination of unique actions on the body.

Some plants appear in more than one category as they affect the body in more than one way.

These categories are an oversimplification, as plants have a variety of different actions combining to make each one unique.

What is a desired action on the body for one person may be a deadly action on the body for someone else. An example of this would be a hypertensive plant, which raises blood pressure, which could be deadly for someone with high blood pressure but desirable for someone with low blood pressure. Even immunostimulant plants, which are in common use against respiratory conditions that suppress the immune system or which take advantage of an already depressed immune system, are contraindicated for people who have autoimmune conditions or are on immunomodulating drugs already.

The role of anti-inflammatory:

Any kind of respiratory ailment likely involves multiple kinds of inflammation, a cellular reaction caused by foreign and non-foreign agents. In the

case of respiratory conditions, the foreign agents can be irritants (pollen, dust, smoke), bacteria, or viruses. The non-foreign agents may be human cells such as macrophages, lymphocytes, neutrophils, and eosinophils.

Plant-based materials that help the body reduce inflammation are known as anti-inflammatories. Inflammation can be desirable – it is part of the body's response to infection and injury. Sometimes, reducing inflammation makes an injury or infection worse. Othertimes, treating the inflammation as a symptom ignores underlying conditions. However, in cases where inflammation is deleterious, there are medicines that address it in various ways.

It should be noted that anti-inflammatories act by reducing the cellular inflammatory response, rather than by relieving the macro-level symptoms of inflammation, as herbs with other actions (e.g., demulcent herbs) do.

Types of Anti-Inflammatory Herbs:

Salicylate-Containing Anti-Inflammatory Herbs:

Salicylates are a widely distributed group of simple phenolics and include compounds such as salicin, methyl salicylate & salicylic acid, with salicin being the first identified compound in this class and used to create the well-known pharmaceutical drug Aspirin.

Salicylates are one of the oldest and most commonly used non-steroidal anti-inflammatory drugs and have been in common use in medicinal herbalism since prehistory.

In the body, salicin is converted into salicylic acid and is used primarily as an analgesic, anti-inflammatory, and anti-rheumatic agent. They are most useful for musculoskeletal inflammation. It is also a key ingredient in many skin care products as a keratolytic and comedolytic agent by causing the cells of the epidermis to shed more readily, opening clogged pores and neutralizing bacteria within, preventing pores from clogging up again by constricting pore diameter, and allowing room for new cell growth.

In general, the actions of salicylates are:

Anti-inflammatory

Analgesic

Antipyretic

Antiseptic

Keratolytic & Comedolytic

Note: Salicin does not demonstrate the antiplatelet effect seen with aspirin

Salicylic acid can upset the stomach, although this is less common when using a hot water infusion of salicylic-containing plants than it is from taking aspirin. In fact, *Filipendula ulmaria*, rich in salicylates, can even be used to stanch mild stomach hemorrhage.

In high doses, salicylic acid has an ototoxic effect by inhibiting prestin, which is the motor protein of the outer hair cells of the inner ear of the mammalian cochlea. It has been known to induce transient hearing loss in zinc-deficient individuals.

Salicylism, which is an acute overdose of salicylates, can produce toxicity symptoms ranging from mild nausea, vomiting, abdominal pain, lethargy, tinnitus, and dizziness, depending on the dose consumed.

Plants that are commonly considered salicylate anti-inflammatories and which are used in the treatment of respiratory ailments:

Plants in the flowering plant families, including Salicaceae (*Populus* sp & *Salix* sp) and *Salix* sp. Willow (*Salix* sp.)

Wintergreen (*Gaultheria procumbens*)

Plants containing steroid precursors:

Steroids were originally plant-derived. Plants that contain secondary metabolites that act like steroids are referred to as "steroid precursors". Some steroid precursors have an anti-inflammatory effect due to being metabolized by the body into steroidal molecules. These are best used to treat autoimmune-related inflammation.

Plants that are commonly considered to be steroid precursors and which are used in the treatment of respiratory ailments:

Liquorice (*Glycyrrhiza glabra*)

Terpene and Terpenoid Rich Plants:

Terpenes and terpenoids are two categories of secondary metabolites that have anti-inflammatory action.

Depending on the specific terpene or terpenoid, they may do so by:

Acting on receptors and neurotransmitters

Acting as serotonin uptake inhibitors (similar to antidepressants like Prozac)

Enhancing norepinephrine activity (comparable to antidepressants like Elavil)

Increasing dopamine activity

Augmenting GABA (an inhibitory neurotransmitter that counters glutamate, an excitatory neurotransmitter)

Some can also ease the digestive system or respiratory system, or skin inflammation.

Plants that are commonly considered terpene or terpenoid-rich anti-inflammatories and which are in use for respiratory ailments include:

German chamomile (*Matricaria recutita*)

Rosemary (*Salvia rosmarinus*)

Calendula (*Calendula officinalis*)

Some plants are anti-inflammatory because they suppress inflammatory pathways by reducing pro-inflammatory cytokines. These can be especially efficacious against COVID-19-related inflammation.

Plants that are commonly considered cytokine-reducing anti-inflammatories include:

Turmeric

Ginger

Rosemary

Garlic

Aconitum spp

The role of antimicrobials:

An antimicrobial is a substance that kills or inhibits the growth of microorganisms like bacteria, viruses, fungi, and parasites. Some plant-based medicines are antimicrobial, helping the body fight against infection. Most antimicrobials need to be used with caution, as they can also kill the body's natural microbes, which are essential for the body to function in a normal, healthy fashion.

There are many, many ways that botanical antimicrobials destroy microbes. Some do so by interfering with a pathogen's metabolism. Some directly kill some microbes they come into contact with. Some block the adhesion of a pathogen to a body system.

Some antimicrobials work best against fungal microbes, some against viruses, some against parasites, and some against bacteria, and are thus subdivided.

Each system of the body has plants that are particularly suited to it, some of which are antimicrobial.

Plant based antimicrobials that are in use for the treatment of respiratory ailments include:

Tea tree (*Melaleuca alternifolia*) c

Cranberry juice (*Vaccinium macrocarpon*)

Garlic (*Allium sativum*)

Thyme (*Thymus vulgaris*)

Goldenseal (*Hydrastis canadensis*)

Osha (*Ligusticum porteri*)

Echinacea (*Echinacea angustifolia* and *Echinacea purpurea*)

Myrrh (*Commiphora molmol*)

Eucalyptus (*Eucalyptus* spp.)

The role of antioxidants:

Antioxidants are substances that inhibit oxidation, a chemical reaction that produces free radicals, which can lead to the degradation of organic compounds.

Antioxidants are linked to improved respiratory health by protecting the lungs from oxidative stress and inflammation caused by infections. Higher dietary intake is associated with a lower likelihood of respiratory ailments, and deficiencies are linked with increased respiratory problems. Some antioxidants reduce the severity and duration of active infections; however, that often requires high doses. More research is needed to establish the efficacy and safety of high-dose plant-based medicines for reducing the severity and duration of an active infection, rather than preventing one from happening or preventing it from becoming severe in advance of the active infection.

Plant based antioxidants that are used in the treatment of respiratory ailments include:

Vitamin C

Vitamin E

Clove (*Syzygium aromaticum*)

Cinnamon (*Cinnamomum* spp.)

Turmeric (*Curcuma longa*)

Ginger (*Zingiber officinalis*)

Thyme (*Thymus vulgaris*)

Fennel (*Foeniculum vulgare*)

Chamomile (*Matricaria recutita*)

Mint (*Mentha* spp.)

Lemon balm (*Melissa officinalis*)

Marshmallow (*Althea officinalis*)

The role of analgesics (Synonymous with anodyne):

An analgesic (from Greek “an-”;³ “ánv-”, “without” and “álgos”, “pain”) is a pain reliever. Analgesics are distinct from anesthetics, which temporarily reduce and/or eliminate sensation; however, analgesia and anesthesia have some neurophysiological overlap, and so an herb may have both analgesic and anesthetic properties.

In the case of respiratory ailments, analgesics may be topical (applied to throat, for example, in the form of a syrup) or ingested to address overall body ache (such as when white willow (*Salix alba*), feverfew (*Tanacetum parthenium*), or valerian (*Valeriana officinalis*) are used to reduce overall body ache in a person with influenza.)

Plants used as analgesics in the treatment of respiratory conditions include:

Echinacea (*Echinacea angustifolia*)

Slipper Elm (*Ulmus fulva*)

Marshmallow (*Althaea officinalis*)

Hollyhock (*Alcea rosea*)

Calendula (*Calendula officinalis*)

Willow (*Salix* spp.)

Poplar and Cottonwood (*Populus* spp.)

Aconite (*Aconitum* spp.)

Feverfew (*Tanacetum parthenium*)

Valerian (*Valeriana officinalis*)

The role of anticatarrhals:

Catarrh is inflammation of the mucus membranes. Anticatarrhal plants assist the body in removing excess mucus. This can be in the sinuses, but also in other parts of the body, although most of the time the term is used for botanical products that help the body remove excess mucus to relieve the symptoms of ear, nose, and throat conditions, such as allergies and infections.

The body needs mucus; it is part of the immune response to microbes. However, an excess of too thick mucus can lead to blockages and infections. Some anticatarrhal herbs thin mucus so that it is less viscous and can more easily be expelled via sneezing, blowing the nose, coughing, etc. Some others directly reduce inflammation of the mucus membranes, allowing mucus to pass through more easily. Others cause the body to produce less mucus. Botanicals that cause the body to produce less mucus should be used sparingly, as they can have a detrimental drying effect or damage the immune system's ability to defend itself from microbes.

Some anticatarrhals work via astringent action, generally from tannins. Some work via anti-inflammatory actions that target specific systems of the body. Others work via being volatile oil-rich. Others work by containing the secondary metabolites flavones and flavonoids.

Plants used as anticatarrhals in use in the treatment of respiratory ailments include:

Goldenseal (*Hydrastis canadensis*)

Goldenrod (*Solidago virgaurea*)

Plantain (*Plantago major* or *Plantago lanceolata*)

Elderberry (*Sambucus nigra*)

The role of antipyretics (also called febrifuges):

An antipyretic is a substance that reduces fever, generally by causing the hypothalamus to override a prostaglandin-induced increase in temperature. They should be used with caution, as fever is a part of the body's immune response to infection.

Plants used as febrifuges/anti-pyretics used in the treatment of respiratory ailments include:

Salicylates (*Salix* spp.)

Feverfew (*Tanacetum parthenium*)

The role of antispasmodics (also called spasmolytic):

Antispasmodics prevent or ease spasms or cramps in the muscles of the body. Many of these plants are also nervines and carminatives, which reduce physical and psychological tension.

Some antispasmodics reduce all muscle spasms throughout the body, while others specifically target body systems or even specific organs. Most antispasmodics affect the autonomic nervous system, rather than the central nervous system, though there are exceptions that affect both.

In the case of respiratory ailments, the desired effect is to reduce spasmodic coughing:

Plants used as antispasmodics that are in use for treating respiratory ailments include:

Chamomile (*Matricaria recutita*)

Ginger (*Zingiber officinalis*)

Passionflower (*Passiflora incarnata*)

Datura (*Datura stramonium*)

The role of demulcents:

Demulcent herbs soothe and protect irritated and/or inflamed tissues, both internally and externally; however, most topical demulcents are referred to as emollients.

Most demulcents are rich in primary metabolite carbohydrate mucilages, which are made up of complex polysaccharide molecules. These become slick and soothing when in contact with moisture.

Some demulcents, however, have a soothing effect on mucous membranes that they don't come into direct contact with, such as in the urinary tract or the lungs, where digestion of the plant matter causes secondary metabolites to enter the bloodstream and act as a soothing, anti-inflammatory agent on those tissues via a mechanism that is not yet well understood.

Some demulcents work best for specific systems of the body, such as the gastrointestinal system, the reproductive system, the excretory system, etc.

For respiratory ailments, demulcents are used to soothe the irritated and inflamed tissues of the lungs and throat.

The use of demulcents internally may impact the rate of drug absorption by forming a semipermeable coating over mucus membranes, delaying gastric emptying, and/or binding with intestinal contents. Caution should be taken when combining demulcent plants with allopathic drugs.

Plants that act as demulcents in use for respiratory ailments include:

Marshmallow (*Althea officinalis*)

Licorice (*Glycyrrhiza glabra*)

Calendula (*Calendula officinalis*)

Plantain (*Plantago major/lanceolata*)

The role of expectorants:

Expectorants facilitate or accelerate the removal of secretions, mostly mucous, from the respiratory system. Most affect the bronchial secretions from the bronchi and trachea.

Expectorants fall into several broad categories:

Stimulating expectorants:

Stimulating expectorants irritate the bronchioles, causing the person to cough. Most stimulating expectorants contain alkaloids, saponins, or volatile oils, but not all alkaloids, saponins, or volatile oils are expectorants. Stimulating expectorants are often emetics at high doses, as they affect the reflex action on the lining of the gastrointestinal system.

Plants used as stimulating expectorants for respiratory ailments include:

Elecampane (*Inula helenium*)

Licorice (*Glycyrrhiza glabra*)

Bloodroot (*Sanguinaria canadensis*)

Hyssop (*Hyssopus officinalis*)

Lobelia (*Lobelia inflata*)

Thinning expectorants:

These help liquefy viscous sputum so that it can be cleared by coughing.

Plants used as thinning expectorants for respiratory ailments include:

Garlic (*Allium sativum*)

Mint (*Mentha* spp.)

Wild cherry (*Prunus avium*)

Mullein (*Verbascum* spp.)

Linden (*Tilia* spp.)

Relaxing expectorants:

Relaxing expectorants actually soothe bronchial spasms. They often contain mucilages and volatile oils that act to relax the respiratory system, loosen mucous secretion, and soothe an irritated cough.

Herbal relaxing expectorants include:

Coltsfoot (*Tussilago farfara*)

Licorice (*Glycyrrhiza glabra*)

Marshmallow (*Althea officinalis*)

Plantain (*Plantago lanceolata/major*)

Mullein (*Verbascum thapsus*)

Fenugreek (*Trigonella foenum-graecum*)

The role of immunostimulants:

Immunostimulants are substances that stimulate the immune system. They may do this by a variety of means.

There are two broad categories of immunostimulants:

Specific immunostimulants provide antigenic action in the immune response, such as vaccines.

Non-specific immunostimulants act to augment immune response outside of antigenic specificity.

Plants used as immunostimulants in use as treatment for respiratory ailments include:

Echinacea (*Echinacea angustifolia* and *Echinacea purpurea*)

Lovage (*Ligusticum* spp.)

Biscuit root (*Lomatium dissectum*)

Andrographis paniculata

Eupatorium perfoliatum

Thuja (*Thuja* spp.)

Mongolian Milkvetch (*Astragalus membranaceus*)

Garlic (*Allium sativum*)

African Geranium (*Pelargonium sidoides*)

Curative Treatment

The role of antivirals and virucidals:

Antiviral substances prevent, relieve, and/or treat viral infections. Some antivirals target specific viruses, while others are broad-spectrum and target a wide range of viruses. Antivirals are one kind of antimicrobial (which also includes antibiotic/antibacterial, antifungal, and antiparasitic substances).

Antiviral is not synonymous with virucidal, which are not a substance that treats or prevents viral infections, but rather ones that specifically deactivate or destroy virus particles, inside or outside of the body.

Please note that many phytochemicals that have effective antiviral activity in the human body need to be isolated and given in clinical doses via allopathic treatment, but there are some exceptions to this.

Plant based antivirals that are in use as treatment for respiratory ailments include:

Selenium

Echinacea (*Echinacea purpurea* and *Echinacea angustifolia*)

Garlic (*Allium sativum*)

Ginger (*Zinziber officinalis*) (against influenza)

Thyme (*Thymus vulgaris*) (against herpes simplex virus 1)

Chamomile (*Matricaria recutita*) (against HSV-2)

Burdock (*Arctium lappa*)

Eucalyptus ((against herpes simplex virus (HSV) and influenza virus))

Licorice (*Glycyrrhiza* spp.)
Elderberry (*Sambucus* spp. fruit)
Garlic (*Allium sativum*)
African Geranium (*Pelargonium sidoides*)
Bloody Crane's Bill (*Geranium sanguineum*)
Poplar and Cottonwood (*Populus* spp.)
Linden (*Tilia* spp.)
Japanese Honeysuckle (*Lonicera japonica*)
Forsythia (*Forsythia suspensa*)
Old Man's Beard (*Usnea* spp.)
Green Chiretta (*Andrographis paniculata*)
Lovage (*Ligusticum* spp.)
Fernleaf Biscuitroot (*Lomatium dissectum*)
Western Sweetroot (*Osmorhiza occidentalis*)
Common Ivy (*Hedera helix*)
White Sage (*Salvia apiana*)
Rosemary (*Rosmarinus officinalis*)
Heal All (*Prunella vulgaris*)
Pines (*Pinus* spp.)
True Firs (*Abies* spp.)
Spruce (*Picea* spp.)
Thuja (*Thuja* spp.)
Juniper (*Juniperus* spp.)

Plant based virucidal that are in use as treatment for respiratory ailments include:

Eucalyptus (*Eucalyptus* spp.)
Australian tea tree (*Leptospermum laevigatum*)

It is beyond the scope of this guide to address every single one of the numerous antiviral plant

species in detail (what phytochemicals are causing the antiviral activity, how they were tested and demonstrated to have that activity, what the limits of the activity are, etc). However, there is a great deal of evidence that the plants listed here contain compounds with activity against viral respiratory illnesses. The clinical efficacy of those listed is quite broad, with many having been studied against a wide range of viruses and demonstrating good antiviral effects.

Specific Plants and Herbs

Echinacea

Echinacea (*Echinacea angustifolia* and *Echinacea purpurea*) is an immune-modulating plant commonly used for the prevention and treatment of respiratory infections. Its active compounds, including alkaloids, polysaccharides, and glycoproteins, enhance the body's immune response.

A meta-analysis of nine studies found that *Echinacea purpurea* was effective in reducing the duration of treatment, the incidence of episodes, and antibiotic usage for upper respiratory tract infections and ear infections of the middle ear in children. (Pham et al, 2025)

Multiple studies have found that Echinacea reduces the severity and duration of acute upper respiratory tract infections in adults, as well. (Barrett et al., 1999)

Prevention of upper respiratory tract infections with Echinacea extracts has been found more clinically effective in children than adults, but adults show more

reduced symptoms of active infection when taking Echinacea extract than children do.

One study found In addition, that high doses of Echinacea purpurea preparation made from fresh herbs and roots at a dosage of 2400 mg to 4000 mg of extract per day significantly reduced Covid-19 infection rates. (Nocolussi et al. 2022)

Another study on Echinacea found that high doses of Echinaforce® extract (2400 mg daily) for four months significantly reduced COVID-19 infection rates and symptom severity in active infections. Another study (Ogal et al) administered the same dose of the same extract to children 4 to 12 years old (1200 mg a day for four months) and found significant reductions in enveloped viruses (COVID-19 and influenza), lower symptoms, and reduced viral loads in nasal secretions (reduced by 98.5 percent!)

Echinacea should not be taken by people with allergies to the Asteraceae (daisy) family, such as ragweed, chamomile, or chrysanthemums. It should not be taken by people with autoimmune conditions that cause an overactive immune system or by those on immunosuppressants. It should be used with caution by those who are on medications broken down in the liver, as it may change how those medications are broken down. It should not be used by people on Warfarin, as it may interfere with that medication and cause clots.

Licorice Root

Licorice Root (*Glycyrrhiza glabra*): Licorice root contains glycyrrhizin, which has anti-inflammatory and antiviral properties. It is used to soothe sore throats and reduce cough. It is a good demulcent and expectorant.

Licorice root has been found in clinical studies to improve immune system response to both viral and bacterial lung infections, inhibit virus growth, produce anti-inflammatory activity, and inactivate some viruses. (Wahab et al, 2002)

It has demonstrated its effectiveness in many studies for inhibiting airway constriction, hyperreactivity, eosinophil infiltration, remodeling, and inflammation in the airway (although this was primarily in the treatment of asthma) (Wahab et al, 2002)

In vitro studies have found that glycyrrhizin, the primary active ingredient of the licorice root, inhibits replication of SARS-CoV-2, but further human trials are needed. (van de Sand et al, 2021)

The upper limit of intake of glycyrrhizin is 100 milligrams per day, which can be found in about 60 to 70 grams of licorice (European Union, 1991). Clinical trials are using a range of 0.015 to 0.229 milligrams per kilogram of body weight per day. One study found no undesirable effects at 2000 milligrams per kilogram of body weight on mice, but that really needs confirmation in a human trial. (Shin et al, 2008)

Most people tolerate licorice root well, but some develop gastrointestinal complaints or vision complaints, which generally resolve after ceasing to ingest the plant or its extracts.

More licorice intake may cause hypertension, water retention, sodium, hypokalemia, and suppress renin-aldosterone. Licorice can cause the body to store water, which is dangerous for those at risk of heart failure. It can also make tachycardia (rapid heart rate) worse, so it shouldn't be taken by people with that condition. It also acts as a phytoestrogen, so people who are attempting to reduce estrogen in their body or who have hormone-sensitive conditions (breast, uterine, ovarian cancer, endometriosis, adenomyosis, uterine fibroids, low testosterone) should not take licorice.

Eucalyptus

Eucalyptus (*Eucalyptus globulus*) is a potent anti-inflammatory, decongestant, and antimicrobial. The primary active compound, eucalyptol (cineole), is a mucolytic agent that breaks down mucus and facilitates easier breathing. (Mieres-Castro et al. 2021)

One study found that cineole improved symptoms found that 200 mg of 1.8-cineol given in capsule form improved symptoms of patients with asthma and COPD and reduced steroid dependence (Jeurgens et al, 2003). This likely has cross-applicability to lung issues caused by respiratory tract infections, but that needs further testing.

Several studies have evaluated cineol in silico against SARS-CoV-2, and it demonstrates significant anti-viral effects, but that needs to be tested further in vitro, animal, and human studies. (Jeurgens et al 2003)

The pure essential oil of *Eucalyptus polybractea*, diffused in a nebulizer for 15 seconds at an oil concentration of 125 micrograms per liter of air in the chamber, completely inactivated influenza-A in the air. Saturated oil vapor was slightly less effective, at a rate of 86 percent elimination of the virus after a day of exposure. However, both aerosolized and oil vapor of *Eucalyptus polybractea* can be used to disinfect the air. (Usachev et al. 2013).

Another study found that *Eucalyptus globulus* essential oil in vapor form resulted in a 94 percent reduction of the virus after 10 minutes of exposure to 250 micrograms of oil vapor. The authors concluded that 10 minutes of exposure to steam diluted *Eucalyptus* essential oil (dilution 1/60) was able to inhibit viral activity. (Vimalanathan et al, 2014)

Eucalyptus is poisonous. Taking only 3.5 milliliters of the oil, less than one teaspoon, can be fatal. It can cause nausea, vomiting, diarrhea, stomach pain, dizziness, muscle weakness, feelings of suffocation, drowsiness, seizures, coma, organ failure, and death.

It is unsafe to apply undiluted *Eucalyptus* oil to the skin or inhale undiluted *Eucalyptus* oil.

The isolate of cineol can be ingested as a supplement. It lowers blood sugar, so it should not be used by people with low blood sugar or who are on blood sugar-affecting medications. It may affect how medications are processed in the liver, so people on medications processed in the liver should check for contraindications.

Eucalyptus oil is unsafe for most pets, particularly dogs and cats. Exposure from skin contact, ingestion, and inhalation of vapours to cineole can cause major health issues, including respiratory distress, tremors, drooling, staggering, seizures, and even collapse. A person should check with their veterinarian if they have an animal other than a dog or a cat, but should assume it is unsafe to have Eucalyptus oil around any pet until it is confirmed as safe.

It is unsafe to use Eucalyptus oil as a topical application or as a vaporized, aerosolized, or steam-diluted inhalant for children under two years of age. Children under 10 years of age may be safe, but it is best to check with a physician first.

Thyme

Thyme (*Thymus vulgaris*) is antimicrobial, antispasmodic, anti-inflammatory, and an effective expectorant, due to its active compounds, thymol and carvacrol.

Thyme essential oil has been tested in in-vitro studies and has shown positive effects for immune boosting of lung cells, inhibiting viruses, bacteria, and fungi, and fighting inflammation, but further animal and human testing is needed. (Nabissi et al, 2018; Pandur et al, 2022)

Thyme can increase a chemical in the body called acetylcholine. This can decrease the effects of anticholinergic drugs and also have an additive effect on acetylcholine levels if someone is already taking medications that increase them (such as many medications for glaucoma and Alzheimer's disease). Thyme is a phytoestrogen, so it shouldn't be taken by people with hormone-sensitive conditions (breast, uterine, ovarian cancer, endometriosis, adenomyosis, uterine fibroids, low testosterone). It can also lower testosterone. It also slows blood clotting, so it should not be used by people with clotting disorders or who are on blood thinners or before surgery.

Marshmallow

Marshmallow root (*Althaea officinalis*) is a calming, mucilaginous plant, the root of which can be processed to coat and soothe mucous membranes. However, it is only beneficial for dry coughs and sore throats and contraindicated for wet coughs. Therefore, it should not be used for a respiratory tract infection that has caused a wet, mucousy cough, but can be used for irritating, dry coughs, as can sometimes be observed in COVID-19.

In a German survey, 822 participants ingested marshmallow root extract lozenges or used a topical marshmallow root syrup for seven days to relieve throat irritation and dry coughing. Most people reported that either product relieved their symptoms in 10 minutes. (Fink et al, 2018)

Another study performed in vitro found that marshmallow root mucilage protected human immune cells from oxidative damage and inflammation and protected inflamed mucosa, allowing for faster regeneration. But more human trials are needed. (Bonaterra et al, 2020)

Marshmallow root is generally well-tolerated. However, it does make a protective layer on the stomach, so it should not be taken at the same time as medication, as it can slow down the digestion and processing of medication. To avoid this, a person needs to space marshmallow root ingestion apart from taking oral medication by at least one hour. Marshmallow root may also decrease blood sugar, increasing the risk of hypoglycemia. It also slows blood clotting, so it should not be used by people with clotting disorders or who are on blood thinners or before surgery.

Elderberry

Elderberry is a potent immune-boosting, anti-inflammatory, and antioxidant.

Elderberry (*Sambucus nigra*) has been found in multiple studies to clinically reduce respiratory symptoms in patients with influenza and rhinovirus. It was more effective against influenza than rhinovirus. No adverse effects other than complaints of the taste of elderberry syrup were reported in any of the studies. (Mahboubi et al, 2020; Mamari et al, 2023)

Elderberry extract was found to be more effective than elderflower-based preparations. Standardized black elderberry extract has been found to significantly shorten symptoms of respiratory tract infections.

It is unsafe to consume elder leaves or stems and unripe or uncooked elderberries. Raw and/or unripe fruit may cause nausea, vomiting, or severe diarrhea.

Elderberry syrup is also a laxative and diuretic, so it should be taken with caution by people on laxative and diuretic medications, or who suffer from certain gastrointestinal disorders (Chrones, IBS/IBD, Ulcerative Colitis). People need to be careful to stay hydrated when taking elderberry syrup. It may also cause nausea.

Elderberry boosts the immune system and should not be used for those who are on immunomodulating medications, immunosuppressants, or who have an overactive immune system.

Mullein

Mullein (*Verbascum thapsus*) has traditionally been used as an anti-inflammatory expectorant. It is also an antitussive (relieves cough) and contains mucilage that soothes irritated mucosa as a demulcent. (Blanco-Salas et al, 2021)

Mullein contains ursolic acid, which has been identified as inhibiting COVID-19. It also contains apigenin, luteolin, and quercetin, all of which also inhibit COVID-19 and other respiratory viruses. (Blanco-Salas et al, 2021)

Mullein is as effective as oseltamivir (Tamiflu) with lower risks of complications and adverse effects. It has been found comparable to diclofenac as an anti-inflammatory for cytokine reduction. (Weiland et al, 2021)

Mullein has demonstrated antimicrobial effects, with aqueous extracts being the most efficient in clinical tests. (Turker et al, 2002)

At this time, the contraindications of mullein have not been well-established.

Willow

Different *Salix* species and the isolated compounds salicylic acid and salicin have been traditionally used for rheumatic diseases, body pain, toothache, headache, and menstrual cramps. They are analgesic, anti-inflammatory, antioxidant, anticancer, cytotoxic, antidiabetic, antimicrobial, anti-obesity, and even have neuroprotective and hepatoprotective activities. (Tawfeek et al. 2021)

Salix hot water extracts are antiviral in vitro studies against both enveloped and non-enveloped viruses. (Reshamwala et al.2023) Animal and human trials are needed.

Salicylic acid acted effectively against SARS-CoV-2 in different animal- and human-derived cell lines and in precision-cut, patient-derived lung slices. It is likely that it would decrease viral loads in human trials, but those haven't occurred yet. (Geiger et al, 2022)

Willow is primarily used in traditional medicine to treat the fever and pain of respiratory tract infections, but it will be interesting to follow its progress in the treatment of active infections, as well.

Willow bark infusions are unsafe for infants and children, as they may cause Reye syndrome, a rare but serious condition that can develop in children and adolescents after taking aspirin during a viral

infection, such as influenza or chickenpox. Willow bark might increase the risk of bleeding in people with bleeding disorders. It slows blood clotting, so it should not be combined with blood thinners or used by people with clotting disorders. People should stop ingesting willow bark at least two weeks before any surgery. People who are sensitive to aspirin (people with asthma, stomach ulcers, diabetes, gout, hemophilia, hypoprothrombinemia, or kidney or liver disease) should avoid using willow bark.

May Not Work or Be Safe

Vicks Vapour Rub:

Vapour rubs such as Vicks, containing camphor, menthol, and eucalyptus oil, are a common treatment for respiratory tract infections. They are applied to the neck and chest. One large randomized controlled trial found that this is unsafe and causes harm that outweighs its benefits. It did not alleviate runny nose, it did not alleviate cough frequency or severity, and had adverse effects, including burning sensations, rashes, and inflammation. (Allen et al, 2014)

It is especially unsafe if applied directly under the nose, which is extremely common. (Rubin et al, 2009)

Peppermint:

Inhaled peppermint essential oil has been found to make people *feel* as though they are breathing better, but not actually clinically improve breathing. (Köteles et al. 2018)

In a randomized double-blind trial, peppermint was compared to a placebo as a treatment for upper respiratory tract infection symptoms. People reported they felt a significant decrease in their symptoms 20 minutes after administration, especially if they had more symptoms. However, there was no statistical difference between the recovery rates of those who

took the peppermint and those who didn't. (Ben Arye-et al, 2011)

Direct application of even diluted peppermint essential oil to the nasal area or chest of infants and young children is unsafe, as it can cause laryngeal and bronchial spasms. Inhalation of menthol may cause laryngospasm. Inhaled menthol must be avoided in newborns, as it is dangerous to them. (Horváth, et al. 2015)

Peppermint oil is dangerous to pets and should not be ingested, applied topically, or used near them, not even in vapour, aerosolized, or as a steam inhalation, as it can cause serious health issues, including respiratory problems, lethargy, muscle tremors, and organ damage.

Recipes and Dosages

Quercetin, Vitamin C, and Bromelain:

Quercetin is generally well-tolerated and does not induce any adverse effects when administered either orally or intravenously at doses up to 1 gram per day and at 10.8 mg per kilogram of body weight (10.3906/biy-2104-16). At high doses, Quercetin may cause several side effects, including nausea, vomiting, diarrhea, abdominal pain, headaches, and a tingling sensation in the limbs, along with other discomforts. (Ma Huang et al. 2024.)

Fresh Parsley, Raw Wild Rocket, and Oranges:

300 grams of fresh parsley (*Petroselinum crispum*), 300 grams of raw rocket (*Diplotaxis tenuifolia*), and 420 grams of oranges provide 1 gram of flavonoids sufficient for the protection and treatment of SARS-CoV-2 infection. (Di Matteo et al, 2020; Haytowitz et al., 2018, for the ratios of flavonoids)

This regimen is still under investigation and needs further human trials, but shows good promise.

Quercetin:

500 milligrams per day of quercetin has been demonstrated to have prophylactic activity against SARS-CoV-2 infection, and 1000 milligrams per day of quercetin has been demonstrated to have clinical efficacy during active infection as a treatment. (Di Matteo et al. 2020).

Chizukit for children:

One randomized, double-blind, placebo-controlled study provided 430 children, aged one to five years old, with an herbal mixture or placebo for 12 weeks during the winter. The children who were given the herbal preparation were given Chizukit, which contains 50 mg/mL of echinacea, 50 mg/mL of propolis, and 10 mg/mL of vitamin C.

The Chizukit group had a significant reduction of illness episodes (138 vs 308, a 55 percent reduction), number of episodes per child (50 percent reduction), and number of days with a fever (62 percent reduction). The total number of days that they were ill was reduced, and the duration of individual episodes of illness was lower. Adverse reactions were very rare, mild, and stopped as soon as the supplement was ceased. (Cohen et al, 2004)

Steam Defusion Recipes:

The primary use of eucalyptus oil includes the treatment of cough, cold, bronchitis, and symptomatic relief of colds and catarrh of the upper respiratory tract. For inhalation, 12 drops per 150 ml of boiling water, or a 1.5% V/V solution prepared from 1 tablespoon (15 ml) per litre of warm water can be applied, and the treatment may be repeated up to three times daily. (Horváth et al. 2015)

The full bibliography of all sources used for this booklet is available upon request. People may email staff@sanctumofthecraft.org to ask for it. It was not included here, because it would make the booklet too long for printing.

