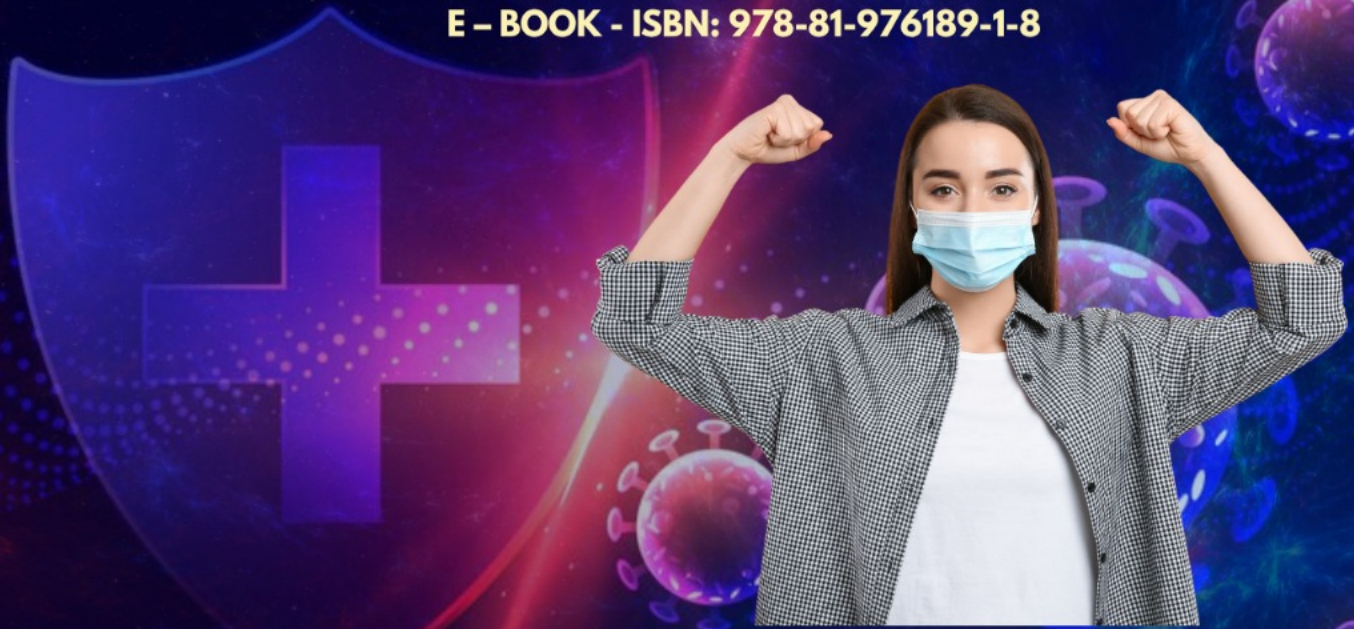


MEDIFIT EDUCATION'S
BUILD
STRONG IMMUNE SYSTEM
NATURALLY

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*| Nutritional Supplements - Multivitamins Multiminerals |
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Postures | Exercise | Pranayam & Breathing Exercises | Meditation |
Good sleep | Head & Body Massage | Hydration | Hygiene | Herbal
remedies | Lifestyle modifications | Pathology Tests |*

Natural ways to Strengthen your immunity

DR MAHESH KUMAR

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Dr Mahesh Kumar



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NUTRITIONAL SUPPLEMENTS - MULTIVITAMINS MULTIMINERALS

What's in a multivitamin?

Before we can say whether or not multivitamins contribute to a healthy immune system, it's worth noting that not all multivitamins are created equal. There's no standard list of vitamins and minerals that a multivitamin should contain. Formulas differ depending on:

- The brand
- The target audience (adults or children and men or women)
- The "goal" of the capsule or gummy (bone health, physical energy, and so on)

Ultimately, the word multivitamin simply means a supplement that contains multiple vitamins and minerals.

However, even though there's no standardized formula, most multivitamins come with a similar list of ingredients, including:

- Vitamin A
- B vitamins (B1, B2, B3, B5, B6, B7, B9, and B12)
- Vitamin C
- Vitamin D
- Vitamin E
- Vitamin K
- Calcium
- Iodine
- Iron
- Magnesium
- Potassium
- Zinc

Can any of these nutrients help boost immunity?

Not every vitamin and mineral in a multivitamin help support your body's immune system, but several are known to be involved:

Vitamin A – Research indicates that vitamin A plays a role in the development, function, and regulation of immune processes and immune cells, including B cells and T cells.

Vitamin D – Known as the "sunshine vitamin," vitamin D is linked to the innate and adaptive immune response. A vitamin D deficiency (the prevalence of which is estimated to be about 42% in the United States population) can make you more susceptible to infection and a weaker immune response.

Vitamin E – Vitamin E has been shown to have both direct and indirect effects on your immune system function. A vitamin E deficiency can impair the regular functions of the immune system, as immune cells are typically enriched in vitamin E.

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Folate (Vitamin B9) – Various studies have suggested that folate (or folic acid, its supplemental form) contributes to increased immunoglobulin production.

Should you take a multivitamin to improve your immune system?

In an ideal world, you wouldn't need to take a multivitamin to boost your immune system function. Instead, you'd receive all the nutrients you need from your diet. However, sometimes we don't consume enough of the right nutrients through the foods we eat alone. Sometimes, due to factors related to diet, genetics, or age, you might need immune support from dietary supplements.

Individuals who may benefit from a daily multivitamin include:

- Vegetarians and vegans
- Seniors
- Pregnant or soon-to-be pregnant people
- Followers of paleo, low-carb, or gluten-free diets

Anyone with a disease that causes a nutritional deficiency

You may find multivitamins beneficial even if you don't fall under one of these categories. Some individuals may need more if they have a deficiency or are expecting. Pregnancy often requires specific vitamins and minerals for both mother and fetus. If pregnant, be sure to speak to your healthcare provider about benefits of a prenatal vs multivitamin. To confirm whether or not you should take dietary supplements, you can test for nutrient deficiencies.

Finally, keep in mind that even if multivitamins may not solve all of your health problems, they have little risk. As long as you follow the product recommendations outlined on the packaging, it's difficult to consume harmful levels of vitamins. With that said, if you have any questions or concerns, be sure to speak with your healthcare provider.

Role of Vitamins & Minerals in Boosting Immunity

One key factor in boosting immunity is ensuring an adequate intake of essential vitamins and minerals. These nutrients play a crucial role in supporting our body's defense mechanisms and keeping us healthy.

Vitamins such as vitamin C, vitamin D, and vitamin E are known for their immune-boosting properties. Vitamin C helps stimulate the production of white blood cells, which are responsible for fighting off infections. Vitamin D plays a vital role in regulating the immune system and reducing inflammation. Vitamin E acts as a powerful antioxidant, protecting our cells from damage caused by free radicals.

Minerals such as zinc, selenium, and iron are essential for a robust immune system. Zinc helps activate enzymes that support the immune response and aids in the production of antibodies. Selenium acts as an antioxidant, protecting cells

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from oxidative stress and enhancing immune function. Iron is necessary for the production of red blood cells, which carry oxygen to various parts of the body including the immune system.

While a balanced diet should provide most of these vitamins and minerals, sometimes it may be challenging to meet our nutritional needs solely through food sources. In such cases, dietary supplements can be beneficial to bridge any gaps in nutrient intake.

If you have specific concerns about your immune health or need advice on how to improve your immunity, it's best to consult with a dietician.

It's important to note that while vitamins and minerals play a significant role in supporting our immune system, they should not be seen as a cure-all or substitute for a healthy lifestyle. Regular exercise, adequate sleep, stress management techniques, and maintaining good hygiene practices are equally important in boosting immunity.

Do supplements really benefit the immune system?

The immune system is a large network of cells, organs, and proteins. It works to protect the body from harmful microorganisms and toxins.

When the immune system works optimally, it does a great job of defending the body. But having a weakened immune system can increase the risk of delayed wound healing, infectious illnesses such as colds, and other infections.

Various vitamins and minerals, often referred to as "micronutrients," are necessary for a healthy immune system.

The main micronutrients that play a role in the immune response include:

- vitamin A
- vitamin C
- vitamin D
- vitamin E
- vitamin B6
- vitamin B12
- folate
- zinc
- iron
- copper

Ideally, we would all obtain optimal amounts of these micronutrients through a well-balanced diet — but this can be difficult to achieve.

Many people worldwide have nutrient deficiencies. In the United States, nearly 95% of the population is not meeting the daily requirements of vitamin D, 84%

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does not get enough vitamin E, 46% does not get enough vitamin C, 45% does not get enough vitamin A, and 15% does not get enough zinc.

Studies show that even a marginal deficiency in one or more of these vitamins and minerals can lead to impaired immune function.

Many factors, such as stress and infection, can further deplete nutrient stores throughout the body.

Meanwhile, aging increases the body's demand for micronutrients. People over 50 tend to need more of certain nutrients, including vitamin D, calcium, vitamin B6, and vitamin B12.

Dietary supplements and immunity

To support a healthy immune system and meet nutritional requirements, a person can make sure that their diet is healthy and take a multivitamin that contains 100% of the recommended daily allowance (RDA) of each nutrient.

However, many standard multivitamins may not contain enough vitamin C. Researchers believe that 200 milligrams (mg) a day is necessary for immune health.

If a person already has a deficiency, they likely need more of that nutrient than a multivitamin contains.

Although some studies suggest that supplementation with multiple immune-supporting micronutrients is beneficial, more research is needed.

Currently, the strongest evidence suggests that these three micronutrients offer immune support: vitamin C, vitamin D, and zinc.

Below, we look at what the research says about taking supplements of these nutrients.

Vitamin C

Vitamin C or ascorbic acid, is a water-soluble vitamin known for its ability to support a strong immune system. In addition to promoting various cellular functions of the immune system, vitamin C helps the body grow and repair tissue, heal wounds, and absorb iron.

Vitamin C is also an antioxidant, meaning that it fights off free radicals, which may help prevent certain cancers and heart disease.

Studies show that a vitamin C deficiency can lead to an impaired immune system and an increased risk of infection.

The human body cannot make vitamin C, so it needs to come from foods or dietary supplements.

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The RDA for vitamin C is 90 mg for male adults and 75 milligrams for female adults. However, many scientists believe this is not enough and recommend 200 mg per day for maximum health benefits.

While most studies show that taking vitamin C does not prevent colds in the general population, it may help reduce the symptoms and severity of a cold. For example, one meta-analysis from 2018 found that taking extra doses of vitamin C may help reduce the duration of the common cold by up to half a day, as well as symptoms such as chest pain, a fever, and chills.

Vitamin C supplementation may be even more beneficial for people who perform heavy physical activity. In five trials with 598 total participants, who were exposed to short periods of extreme physical stress, vitamin C reduced common cold risk by nearly 50%.

Vitamin D

Vitamin D plays a critical role in keeping the immune system strong so that the body can fight off bacterial and viral illnesses, such as a cold. Some clinical trials suggest that supplementation of 400 international units (IU), or 10 micrograms (mcg), of vitamin D per day may help prevent the common cold.

Other studies show that vitamin D treatment can reduce respiratory tract infections, especially in those with a vitamin D deficiency.

Some researchers also believe that there is a link between vitamin D deficiency and an increased risk of COVID-19 hospitalization, though there is controversy about this claim. In some cases, it has been used to minimize the impact of socioeconomic factors for at-risk groups.

Many experts believe that the current vitamin D RDA of 600 IU (15 micrograms) for people up to age 70 and 800 IU (20 micrograms) for people over 70 is not enough to support healthy immune function.

However, the evidence remains inconclusive, and finding the dosage that best supports immune function requires further research.

Zinc

A zinc deficiency can weaken the immune system by impairing the formation, activation, and maturation of lymphocytes, white blood cells that are an active part of the immune system.

Several studies suggest that low zinc levels can increase the risk of viral infections. Some also show that zinc lozenges may shorten the duration of the common cold.

However, identifying the best dosages for supporting immune health and treating colds will require further research.

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The immune system is an incredibly complex system and works 24/7 to protect us from invading pathogens and infections. Several factors including ageing, stress, and nutrition deficiency can affect our immune system. A balanced diet and the right nutrition hold the potential to support the immunity system. In order to strengthen the body's immunity, one must include Vitamin C, Vitamin A, Vitamin D, Vitamin E, Iron, Selenium, Folate, and Zinc in their diets to avoid frequent illnesses and infections.

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NON COOKED RAW FOODS

Benefits of eating raw foods

Don't mistake eating raw foods as a trope of health-conscious high society. It's actually a very basic way to eat that is not only healthy, but great for the planet. There's a third benefit too that you just may be interested in—it's good for your libido—which means raw foods can bring you joy.

What are raw foods?

Raw foods are uncooked, unprocessed, and typically organic. Staples of the raw food diet are fruits, vegetables, nuts, seeds and sprouted grains. Select raw food enthusiasts also eat unpasteurized dairy, raw eggs (can't help but think of Rocky here), meat and fish. The food is eaten cold or moderately warm. The rule is, to be considered raw, it must never go above 118 degrees.

So, why eat raw?

The idea is that cooking food destroys many of the nutrients and natural enzymes. Enzymes are highly beneficial to health and disease prevention. Read more about the specific benefits of enzymes here.

That means raw foods are high in vitamins (B and C especially), minerals, fiber, phytochemicals and enzymes.

The nitty-gritty on raw food benefits

Immunity: Vitamin B and C boost immunity, so your body can fight illness and disease like a champ. Raw foods have a lot of antioxidants too, which are great soldiers in the immunity army.

Energy: Because the vitamins and minerals in raw food are unprocessed and not zapped with heat, your body gets a major boost. This means raw food eaters can expect an increase in energy and vigor.

Better Digestion: Fiber and enzymes are partners in crime when it comes to marshaling excellent food digestion and elimination. Poor digestion doesn't just mean a bellyache, it also means your body isn't able to absorb the nutrients in the food it ingests. Fiber and enzymes fight the good fight to make sure your body receives all the benefits of the foods you eat, and that those foods are eliminated with ease.

Abstract

Uncooked food is an integral component of human nutrition, and is a necessary precondition for an intact immune system. Its therapeutic effect is complex, and a variety of influences of raw food and its constituents on the immune system have been documented. Such effects include antibiotic, antiallergic, tumor-protective, immunomodulatory, and anti-inflammatory actions. In view of this, uncooked food can be seen as a useful adjunct to drugs in the treatment of allergic, rheumatic and infectious diseases.

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Pump up the volume

If you want to maximize the impact of food on your immune system, you'll need to dramatically increase the amount of fruits and vegetables you eat each day.

Her team investigated immune responses in animals fed two to three servings of fruits and veggies a day, and compared them to those who ate five to six servings a day or eight to nine servings a day.

"The eight to nine servings a day was where we were seeing the best effect."
"So it's not just increasing the intake by a little bit, you've got to increase it substantially. People need to work at it in order to reach that level."

Finding ways to insert fruits and veggies into every meal and snack during the day may do more than pump up your immunity. A 2017 study found a significant reduction in the risk of heart attack, stroke, cancer and early death by eating 10 portions of fruit and vegetables each day.

Current dietary guidelines in the United States recommend at least 2 cups of fruit and 2.5 cups of vegetables a day. Yet surveys by the US Department of Agriculture found the average American eats only 0.9 cups of fruit and 1.4 cups of vegetables per day.

It's not just Americans. One in 5 deaths globally – that's about 11 million people – occurred because of too much sodium and a lack of whole grains, fruit, nuts and seeds, a 2017 study found.

5 Foods Which May Be Healthier Eaten Raw

It's not just what you eat, it's how you eat it.

Incorporating more raw foods into your diet is not only beneficial for your health, but it is also a smarter way to eat. Cooking or heating is beneficial for some foods to be digested well or bring out key nutrients. For other foods however, the more you cook the food, the more you breakdown it's nutrients which could have instead been processed and absorbed by the body; creating a higher energy content in the food rather than maintaining its nutrient density.

Maximise the amount of nutrients you are absorbing from your food by adding these five raw foods to your diet:

1. Broccoli

Commonly listed as one of the top five healthiest vegetables you can eat, broccoli is full of nutritional benefits essential to a healthy body. According to Healthline, "one cup (91 grams) of raw broccoli provides 116% of your daily vitamin K needs, 135% of the daily vitamin C requirement and a good amount of folate, manganese and potassium".

A key compound of this superfood is called sulforaphane, which activates the body's detoxifying enzymes to help fight cancer cells and influence a number of

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benefits such as lowered blood pressure, healthy blood-sugar levels, immunity-boosting antioxidants, improved heart health and anti-ageing properties. Studies have shown that raw broccoli can contain up to ten times more sulforaphane than cooked broccoli. Eating broccoli enables you to absorb higher amounts of this superfood compound faster, allowing you to gain the benefits which are otherwise significantly reduced when consuming broccoli cooked.

2. Watercress

“One of the superfoods that isn’t talked about very much but is the king of nutrient density is a beautiful humble green: watercress”, says the award-winning nutritionist and Gastronomy & Nutrition lecturer, Chef Samantha Gowing. “We should all be having more sprouts, watercress and all those lovely living leaves, they are so healthy for us.”

Watercress is another member of the cruciferous family, alongside broccoli, which contains important enzymes that are damaged when heated. When watercress is eaten raw, the potency of its many helpful anti-cancer compounds (called phytochemicals) are maintained and absorbed by the body, allowing you to gain the full benefits of this underrated leafy green.

3. Onions

Does the thought of eating a raw onion bring tears to your eyes? Onions contain a powerhouse of nutrients, including vitamin C, antioxidants, fiber, flavonoids, and sulfuric compounds. The enzymatic reaction of the sulfuric compounds is the reason why we tear up when cutting an onion, but they are also what makes a raw onion superior to cooked onions. The benefits of sulfuric compounds in raw onions include reducing the level of cholesterol in the body, promoting insulin production, as well as helping breakdown blood clots which help lower the risk of stroke, heart disease and diabetes.

4. Garlic

Garlic is another pungent food which contains special sulfuric compounds. Offering a variety of health benefits, such as aiding balanced blood sugar levels, brain health, improved memory, supporting healthy cholesterol levels and heart health, garlic is mostly known for its high level of antioxidants. Studies have shown that the antioxidants and sulfuric compounds in garlic may help boost the immune system and decrease inflammation. Raw garlic contains higher amounts of these anticarcinogenic (anti-cancer) sulfuric compounds and according to studies, cooking can destroy these beneficial elements.

5. Capsicums

Capsicums (bell peppers) contain nearly three times your daily vitamin C intake, as well as being packed full of vitamin B6, vitamin E, magnesium and antioxidants. Capsicums are a nutritious and tasty option whether they are eaten cooked or raw, however a few of the capsicum’s key nutrients are affected by heat. A study found that red capsicums lose up to 75% of their antioxidants when cooked, as well as a 15-40% reduction in their fibre content when heated. The B and C vitamins are also water-soluble and degrade with heat, so adding

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raw capsicums to your diet may boost the nutritional value compared to cooking them.

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PHYTOCHEMICALS

Abstract

Phytochemicals are chemical compounds produced by plants. Actually, it is produced by primary and secondary metabolism. Vegetables, fruits, whole grains, nuts, seeds, etc., are rich with phytochemicals and impart aroma, colors, and flavors. There are many phytochemicals like polyphenols, flavonoids, carotenoids, phytoestrogens, phytosterols, etc. They act as antioxidants against diseases related to lungs, urinal, stomach, and heart and can be used as nutraceuticals to control various metabolic disorders. Medicinal plants have been regarded as beneficial for many centuries. In India, Himalayas and Western Ghat regions are diverse in such plants. It has many beneficial effects on human health and boosts up immunity. Tens of thousands of phytochemicals have been identified, and many more are yet to be discovered. Synthetic medicine is known to cause many side effects on human health, and having such natural medicinal plants in diet is believed to be beneficial without side effects. They may increase immunity to fight against today's diseases like SARS, MERS, and Coronavirus (CoV) infections. The phytotherapy or the phytomedicines are effective immunity boosters and have the potential to eliminate bacterial as well as viral infections. Phytochemicals like phenolic compounds, vegetables, and fruits containing such compounds in the human diet may be effective against coronaviruses and people cure due to having it in their diet too. Still more research and identification of such compounds are required to get more information regarding its benefits. The phytotherapy-based research and developing phytotherapeutic medicines could cure many more chronic as well as acute diseases. This chapter deals with comprehensive information on phytochemicals and its importance.

Types of phytochemicals

Experts have identified thousands of phytochemicals but only closely studied certain ones. But what they've uncovered includes impressive health benefits.

Well-known phytonutrients include:

- Anthocyanidins, produced by red and purple berries
- Beta-carotene, found in orange and dark green leafy vegetables
- Catechins, present in black grapes, apricots and strawberries
- Carotenoids, produced in pumpkin, carrots and bell peppers
- Flavonoids, found in tea and wine
- Isoflavones, contained in soybeans
- Polyphenols, produced by cloves, berries and dark chocolate

How to incorporate phytonutrients into your diet

Phytonutrients give foods their color and smell — though there are still phytochemicals in white foods such as onions and garlic. Eating a colorful diet is an easy way to make sure you're getting all types of phytochemicals.

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If you don't love vegetables or struggle to incorporate them into your meals, "People forget that herbs and spices have phytochemicals." "But they are fragrant and offer a variety of colors. They also have some of the highest antioxidant properties and are easy to add into almost any meal."

Phytochemicals and cancer: What you should know

Phytochemicals are compounds in plant foods that can help prevent chronic diseases like cancer.

You may not have heard of phytochemicals, but it's likely you eat them every day.

Phytochemicals, also called phytonutrients, are the potentially helpful compounds found in plant foods. They may help prevent chronic diseases, including cancer.

These can be found in vegetables, fruits, beans, grains, nuts and seeds. But the type and amount of phytochemicals in different plants varies. No single plant food can protect you from disease. You can get the most protection by eating a variety of plant foods.

More research is needed to determine how phytochemicals work. What most researchers do agree on is the benefits.

Potential benefits of phytochemicals include:

- Strengthening the immune system
- Reducing inflammation
- Preventing DNA damage and helping DNA repair
- Slowing cancer cell growth
- Regulating hormones
- Preventing damaged cells from reproducing

There's no specific recommendation from the medical community when it comes to phytochemicals. But the American Cancer Society recommends eating a diet high in vegetables and fruits.

"If you're eating a high number of vegetables and fruits, then you're getting a high number of phytochemicals."

CONCLUSION

Our immune system protects us from infections, diseases, toxins, allergenic proteins, and unwanted biological invasions. Any impairment in its activities could make host susceptible to a multitude of infections. In general, all the fruits discussed above possess promising immune stimulation activity. The consumption of adequate amount of fruits is necessary for the optimal functioning of our immune system. They abound micronutrients like vitamins A,

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C, and E along with nonnutritive phytochemicals like carotenoids, flavonoids, phenolic acids, and tannins. These bioactive compounds are essential for antibody production, stimulating phagocytosis, inhibition of activity of proinflammatory cytokines, lymphocyte proliferation, and to enhance the working of natural killer cells. They keep our immune system in surveillance mode and play a key role in enhancing cells involved in both innate and acquired immune response. Scavenging of free radicals is the major mechanism through which they protect the cells of our body from oxidative damage and boost our immunity. Therefore, a diet deficient in fruits leads to immunosuppressive condition and make our body prone to diseases. Despite the encouraging information on role of these bioactive compounds in immune system modulation, there is lack of research suggesting the specific mechanism of their activity. More in vivo studies are needed to understand the activity of various phytochemicals. This comprehensive review throws light on composition of phytochemicals in fruits along with their mechanism of action and this information could be utilized further for development of novel immune booster functional foods with natural ingredients.

Immunomodulatory potential of phytochemicals and other bioactive compounds of fruits: A review

Amla

Amla (*Emblica officinalis*) or Indian gooseberry fruit is rich in various bioactive components that impart immunomodulatory, anti-tumor, antioxidative, hepatoprotective, and ROS scavenging properties to it as shown. ROS are produced during common biochemical reactions that take place in our body and are responsible for the "oxidative stress," which alters the cell components into a diseased state. They are also known to affect cell-mediated response of the immune system by amplifying the inflammation at the site and causing auto-immune disorders. So, antioxidants are required to neutralize this effect. Researchers have proved that vitamin C and several other phytochemicals present in amla are effective antioxidants and they render it immunomodulatory properties too.

This shielding effect of amla was attributed to its phytochemical constituents that allow maximum conjugation with free radicals thus, decreasing their number and extent of cellular damage.

Apples

Apples or *Malus domestica* are a popularly eaten fruit that contain various phytochemicals in abundance, and various studies have shown that intake of apples provide health benefits like decreased risk of cancers, diabetes, cardiovascular disease, and asthma. Apples have powerful antioxidant activity; they minimize multiplication of cancer cells, reduce lipid oxidation, and decrease cholesterol.

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Bananas

Banana mainly grows in humid climate and it is the member of family Musaceae and genus Musa. It has ample amount of various bioactive substances like polyphenols, biogenic amines, carotenoids, and phytosterols. It also contains ample amount of minerals like potassium that is beneficial for muscles and iron that is required by the people who are anemic and have high blood pressure. The response of the host body toward various pathogens that gain entry in the body is influenced by the iron intake.

Different carotenoids like α -carotene, β -carotene, isoleutin, and β -cryptoxanthin are also present in banana fruit. It has been observed that they are responsible for decrease in chances of occurrence of different diseases related to eyes and heart. They also act as antioxidant and boost the immunity. α -Carotene content in bananas lies between 0.20 and 1.1 mg/100 g edible portion of fruit.

Berries

Consumption of fruits having good amount of anthocyanins have led to enhanced immune response in the body. The key role players in the immune system like natural killer cell activity, cytokines, and lymphocytes have been boosted by intake of diet rich in polyphenols. Anthocyanins, the major polyphenolic compound found in blue berries interact with $\gamma\delta$ T cells, a special immune cell that has influence on both acquired and innate immunity. These cells are present in digestive and respiratory systems, and they protect the body from any pathogens that gain entry via these paths. The cells of our immune system are generally triggered by PAMP (pathogen-associated molecular patterns). They make our immune system active so as to fight against expected pathogens. Similarly, anthocyanins can also trigger our immune cells as they can mimic PAMP and make $\gamma\delta$ T cells work in a proactive mode. ROS is generated in our body due to the activity of immune cells against pathogens. ROS production is harmful for the normal functioning of our healthy tissues. Anthocyanins found in berries not only enhance the functioning of our immune system but also prevent body tissues from oxidative damage caused by ROS due to their antioxidant potential. The administration of wild blueberry drink notably inhibited the amount of endogenously oxidized DNA bases and H₂O₂-activated DNA destruction.

Polysaccharides found in blueberries have the ability to decrease tumor growth by 73.4% effectively and thus it is an effective immunomodulator. Apart from defending the hepatocytes against oxidative damage and regulating the activity of T-cells, blueberry can also amplify hepatic immunity in mice.

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Grapes

Grapes or *Vitis vinifera* is a nonclimacteric fruit grown on the deciduous and perennial woody vines. Grapes contain plenty amount of vitamin C, an excellent water-soluble antioxidant. Several epidemiological studies have revealed that vitamin C scavenges the free radicals or reactive oxygen species in our body, thereby protecting cells, DNA, and lipids from oxidative damage. Vitamin C content in grapes is between 31 and 61 mg/100 g.

Some important polyphenols found in grapes like anthocyanins, flavanols, flavan-3-ols, proanthocyanidins, and resveratrol impart it health beneficial properties such as antioxidant, antimicrobial, anti-inflammation, anticancer, antiaging, and cardioprotective as depicted. Anthocyanins and proanthocyanidins found in grapes could modulate the activity of our immune system by supporting the functioning of $\gamma\delta$ T cells.

Kiwi fruit

Kiwi fruit was earlier known as Chinese gooseberry. *Actinidia chinensis* and *Actinidia deliciosa* are commonly known as green and gold kiwi fruit, respectively. It is relatively plentiful source of vitamin C, vitamin E, folate, potassium, phytochemicals, and enzymes especially actinidin. Existing literature support the fact that supplementation of kiwi fruit in diet can provide health benefits like improved immune, gastrointestinal, and cardiovascular functions. depicts the immunomodulatory activity of various functional constituents of gold and green kiwi fruits.

Orange

Orange or *Citrus sinensis* is known all around the world for its nutritional and medicinal benefits. As reported in the literature that there is minimal chance of dangerous illness like cardiovascular diseases, hypertension, cataract, stroke, and especially cancers in people who consume citrus fruits. This shielding effect is due to the antioxidant properties of bioactive elements like vitamin C, flavonoids, β -carotene, and folic acid which are present in citrus fruits in good amount.

Carotenoids present in orange boost both specific and nonspecific immune activities. It is reported that they quench reactive species produced by different immunoactive cells, scavenge immunosuppressive peroxides, support the maintenance of membrane receptors which are crucial for immune functions, and are responsible for secretion of immunomodulatory lipid molecules like leukotrienes and prostaglandins.

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Papaya

Papaya or *Carica papaya* is a fruit mainly grown in tropical areas that is clinically used in the cure of several illnesses comprising of inflammatory problems. The major functional constituents of papaya and their immune boosting characteristics have been represented.

Antioxidant phytochemicals in papaya led to a reduction in consumption of these antioxidant enzymes. It was also found that this extract lead to an increase in the amount of immunoglobulin IgM and IgG. Due to a notable rise in the amount of serum immunoglobulin it ultimately enhances the humoral immunity.

Watermelon

Watermelon or *Citrullus lanatus* is a tropical fruit from the Cucurbitaceae family. It contains a wide variety of micronutrients including vitamin A, B, C, and minerals like calcium, iron, phosphorus, and magnesium. It is also abundant in lycopene, β -carotene, citrulline, and some other flavonoids that impart it anti-inflammatory, anti-hypertensive, and immunomodulatory properties. represents the major bioactive compounds present in watermelons along with their immune boosting effect.

Other important phytochemicals found in watermelon include β -carotene. It supports platelet accumulation that is responsible for the reconstruction of blood vessels. It also strengthens our immune system and helps in proper functioning of heart, kidneys, and other vital organs. β -carotene concentration in watermelon flesh is about 4.82 mg/100 g.

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AASANS - YOGA PHYSICAL POSTURES

Yoga has recently become increasingly popular in improving physical and mental health. Some believe yoga can boost immunity, but limited scientific evidence supports this claim. There are many different types of yoga, but most involve some combination of postures, breathing exercises, and meditation. Some research suggests that these practices may help to boost immunity by reducing stress levels and improving circulation. However, more research is needed to confirm these effects. If you want to try yoga for immunity, many classes and resources are available. Consult your doctor first, especially if you have any underlying medical conditions.

Is it All About Movement?

There is a lot of evidence to suggest that movement is a factor in boosting immunity. One study found that people who did yoga significantly increased their levels of immunoglobulin A, an antibody that helps fight infection. Other research has shown that physically active people have lower rates of colds, flu, and other respiratory infections. There are a few possible explanations for why movement might help boost immunity.

Yoga for Immunity in Cool Seasons

The fall and winter seasons bring great beauty, a chance for introspection, and an opportunity to slow down. The fall and winter are also when many of us catch a cold or seasonal flu. Suppose you find that you get frequent colds during this time of year. In that case, you may want to consider incorporating Yoga asanas that are inversions into your practice to enhance the functioning of your immune system. Our immune systems are detrimentally affected by a poor diet, lack of restorative sleep, high stress, and environmental toxins. Prescription and non-prescription drugs and an unhealthy level of alcohol consumption can also negatively affect the immune system.

Physical Exercise

First, exercise can help reduce stress levels, and chronic stress can weaken the immune system. Second, physical activity can cause changes in the cells and fluids in the body, which might help fight off infection. Finally, movement may help improve circulation, allowing the body to transport immune cells where needed. So if you're looking for ways to boost your immunity, adding extra movement to your day may be a good place to start.

How Yoga Boosts Your Immune System

Yoga can be a helpful way to boost your immune system and decrease inflammation in the body.

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Psychological stress can impact many systems in the body, including weakening the immune system and increasing chronic inflammation. Inflammation is a natural part of the immune response and in the short term can be helpful to heal wounds, injuries, and infections, but chronic inflammation can do more harm than good.

Researchers collectively reviewed 15 randomized controlled trials that examined whether the regular practice of yoga postures could strengthen the immune system and reduce chronic inflammation. The average sample size of the trials was 70, and sample sizes ranged from 11 to as many as 140 participants. The majority of studies used Hatha yoga, a general term that indicates a style that includes postures.

Scientists in these yoga trials examined the immune system response by measuring blood or saliva levels of circulating pro-inflammatory markers such as cytokines, a protein called C-reactive protein (CRP), as well as immune cell counts, antibodies, and markers of gene expression in immune cells.

10-minute Yoga stretches to boost immunity

"Regular practice of yoga has shown to have a profound influence on human immunity. Through its stimulation of the lymphatic system, yoga facilitates the removal of toxins, thereby strengthening one's body against infections and illnesses. Certain poses enhance blood flow to the head and activate the thyroid gland which regulates the immune function. Pranayama techniques balance the nervous system and enhance oxygenation, providing further support to immune response. Yoga also reduces levels of stress hormones like cortisol, creating an internal environment conducive to optimal immune function."

1. Setubandhasana

Steps: Lie on your back with knees bent and feet hip-width apart. Inhale and lift hips towards the ceiling, engaging thighs and hips. Hold for a few breaths and exhale while lowering the spine back to the mat.

Benefits: Facilitates efficient transport of immune cells, relieves tension and stress, and engages core and lower body for overall fitness.

2. Ushtrasana

Steps: Kneel with knees hip-width apart. Inhale, lean back, and reach for your heels. Hold, opening the chest, and exhale while returning to the starting position.

Benefits: Stretches the chest, promotes lung expansion, stimulates the nervous system, fostering adaptability.

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3. Ardha Matsyendrasana

Steps: Sit with legs extended, bend the right knee, placing the foot outside the left thigh. Twist the torso to the right, placing the left elbow outside the right knee. Hold, then repeat on the other side.

Benefits: Stimulates the digestive organs, promotes detoxification, enhances immune function.

4. Trikonasana

Steps: Stand with feet wide apart. Turn the right foot out, extend arms parallel to the ground, and reach towards the right foot. Hold the pose, then switch sides.

Benefits: Stretches and strengthens the thighs, knees, and ankles, stimulates abdominal organs, improves digestion and immune function.

5. Sarvangasana

Steps: Lie on your back, lift legs and torso, supporting the back with hands. Point toes upwards, aligning the body in a straight line. Hold for a few breaths, then release.

Benefits: Increases blood flow to the head, stimulates thyroid gland, improves immune regulation.

Research

A study published in *Frontiers in Immunology* found that “yoga reduces stress and anxiety, two known risk factors for immunosuppression.” Additionally, other research has shown that meditation can help to improve sleep quality, which is also linked to a strong immune system. While more research is needed in this area, the preliminary evidence indicates that yoga and meditation could help boost immunity.

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EXERCISE

Abstract

It is generally accepted that moderate amounts of exercise improve immune system functions and hence reduce the risk of infection whereas athletes engaged in regular prolonged and/or intensive training have a higher than "normal" incidence of minor infections, especially of the upper respiratory tract (URT, e.g., common cold and influenza). This is likely related to regular acute (and possibly chronic) periods of exercise-induced changes in immune function. URT infections can compromise performance directly if suffered shortly before or during competition or indirectly if suffered at other times via effects on training and/or physiological adaptations. This chapter covers the effects of exercise (acute and chronic), both positive and negative, on immune function and consequent infection risk, and considers the current state-of-the-art for monitoring and assessing this in athletes.

Introduction

It is generally accepted that moderate amounts of exercise improve immune system functions and hence reduce the risk of infection. However, there is strong evidence that athletes engaged in regular prolonged and/or intensive training have a higher than "normal" incidence of minor infections, especially of the upper respiratory tract. This is particularly apparent in endurance athletes such as cyclists, runners, swimmers, and triathletes, but any athletes with a high training load and/or suboptimal recovery may be at increased risk. Such infections can compromise training and/or competition performance.

Exercise and immunity

Battling another cough or cold? Feeling tired all the time? You may feel better if you take a daily walk or follow a simple exercise routine a few times a week.

Information

Exercise helps decrease your chances of developing heart disease. It also keeps your bones healthy and strong.

We do not know exactly if or how exercise increases your immunity to certain illnesses. There are several theories. However, none of these theories have been proven. Some of these theories are:

- Physical activity may help flush bacteria out of the lungs and airways. This may reduce your chance of getting a cold, flu, or other illness.
- Exercise causes changes in antibodies and white blood cells (WBCs). WBCs are the body's immune system cells that fight disease. These antibodies or WBCs circulate more rapidly, so they could detect illnesses earlier than they might have before. However, no one knows whether these changes help prevent infections.

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- The brief rise in body temperature during and right after exercise may prevent bacteria from growing. This temperature rise may help the body fight infection better. (This is similar to what happens when you have a fever.)
- Exercise slows down the release of stress hormones. Some stress increases the chance of illness. Lower stress hormones may protect against illness.

Exercise is good for you, but, you should not overdo it. People who already exercise should not exercise more just to increase their immunity. Heavy, long-term exercise (such as marathon running and intense gym training) could actually cause harm.

Studies have shown that people who follow a moderately active lifestyle, benefit most from starting (and sticking to) an exercise program. A moderate program can consist of:

- Bicycling with your children a few times a week
- Taking daily 20 to 30 minute walks
- Going to the gym every other day
- Playing golf regularly

Exercise makes you feel healthier and more energetic. It can help you feel better about yourself. So go ahead, take that aerobics class or go for that walk. You will feel better and healthier for it.

There is no strong evidence to prove that taking immune supplements along with exercising lowers the chance of illness or infections.

Does Exercise Boost Immunity?

It turns out regular physical activity does play a role in keeping you healthy and preventing illnesses. That's because exercise contributes to your overall health, which may help support your immune system's functions.

This article explains the theories behind how exercise can support your immune system and gives some insight into whether you should work out when you're sick.

Does regular exercise help your immune system?

In short, yes. Exercise benefits your body in a number of ways, and boosting your immunity is just one of those. But there is one important caveat: The frequency, duration, and intensity of your workouts matter.

Research shows that when it comes to boosting your immunity, moderate-intensity exercise is best.

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In general, exercising at a moderate to vigorous intensity for 60 minutes or less is optimal for the immune-boosting benefits of exercise. If you do this daily or almost daily, your immune and metabolic systems continue to strengthen, building on previous gains.

6 ways exercise benefits the immune system

A healthy immune system protects your body from bacteria, viruses, and other pathogens you encounter daily.

1. Exercise stimulates cellular immunity

According to a 2019 research review, moderate-intensity exercise can stimulate cellular immunity by increasing the circulation of immune cells in your body. This helps your body better prepare for a future infection by detecting it earlier.

Researchers found that performing aerobic exercise at a moderate to vigorous intensity for less than 60 minutes (an average of 30–45 minutes) increases the recruitment and circulation of the immune system's best defensive cells.

These findings indicate that regular exercise can enhance immune defense activity by making you more resistant to infection and better equipped to deal with infectious agents that have already gained traction in your body.

2. Exercise raises body temperature

Unless you're moving at a snail's pace, your body temperature will increase during most forms of exercise and will stay elevated for a short time after you complete a workout.

It's a commonly held belief that this brief rise in body temperature both during and after exercise may prevent bacteria from growing and help your body better address an infection, similarly to how a fever works.

Still, it's important to note that this claim lacks evidence-based support.

While this temporary temperature rise is not as significant as the increase you experience with a fever, it still may be beneficial to your immune system.

3. Exercise helps you sleep better

Regular physical activity can contribute to better overall sleep quantity and quality.

This is great news since sleep loss can negatively affect certain parts of the immune system.

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Some research points to a higher risk of infection and development of cardiovascular and metabolic disorders due to a reduction in antibodies and the production of inflammatory cytokines in people with a modest amount of sleep loss.

4. Exercise decreases risk of heart disease, diabetes, and other diseases

Exercises can reduce cardiovascular risk factors, prevent or delay development of type 2 diabetes, increase HDL (good) cholesterol, and lower resting heart rate.

Having one or more of these conditions may make it more difficult for your immune system to ward off infections and viral illnesses such as COVID-19.

5. Exercise decreases stress and other conditions such as depression

There's a reason people like working out after a long day at work: It helps decrease stress.

More specifically, moderate-intensity exercise can slow down the release of stress hormones while positively influencing the neurotransmitters in the brain that affect mood and behavior.

Furthermore, regular exercise may offer a protective benefit against stress — meaning that exercise helps you proactively handle stressors with more resilience and a better mood.

According to some research, stress and depression can have a dramatic impact on the regular function of the immune system, leading to a low chronic inflammation status that favors infections, diseases, and other illnesses.

6. Exercise reduces inflammation

Inflammation is a normal immune system response that your body uses to address pathogens or toxins.

Acute inflammation isn't necessarily a problem, but when that acute response remains uncontrolled, it can become chronic and potentially lead to a host of inflammatory diseases.

Research has shown that exercise can reduce inflammation and keep that immune response in check — but exercise intensity matters.

Studies suggest that moderate-intensity exercise reduces inflammation, while prolonged bouts of high intensity exercise can actually increase inflammation.

Build Strong Immune System Naturally

Walk and Bike to Boost Your Immune System

A strong immune system is essential for fighting off illness. While many factors influence the strength of your immune system, physical activity can play a big role.

The immune system is a complex network of cells, tissues, and organs. Together they help defend your body against infections and diseases. Substances harmful or foreign to the body, germs, like a virus, are called antigens. Your immune system's response to an antigen is to make antibodies — proteins that work to attack, weaken, and destroy antigens. Your body also makes other cells to fight the antigen.

Your immune system remembers the antigen, and if it sees it again, recognizes it and sends out the right antibodies, so you don't get sick.

The COVID-19 mRNA vaccines work like this – they teach cells how to make a protein that triggers an immune response producing antibodies, to protect you from getting infected if the virus enters the body.

Regularly going for a walk or taking a bike ride can benefit your immune system by helping immune cells to perform effectively — increasing blood flow, reducing stress and inflammation, and strengthening antibodies.

Getting the blood circulating, achievable by walking or biking often, helps the white blood cells in the immune system roam around the body as needed.

Stress can suppress the effectiveness of the immune system, so here's where stress-busting physical activity helps.

Reduced inflammation allows the immune system to perform better. Even just 20 minutes a day of vigorous exercise, with its anti-inflammatory effect, can give the immune system a boost. Developing a habit of 30 minutes each day, say a fake commute of moderate exercise, like a bike ride or brisk walk, can reduce inflammation and help immune cells regenerate regularly.

A daily dose of physical activity also stimulates the recruitment of the immune system's best fighter cells.

The more consistently you move your body, the better prepared the immune system is to wipe out what makes you sick.

It also doesn't hurt that walking and biking improve the health of the environment too.

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PRANAYAM & BREATHING EXERCISES

Pranayama boosts your immune system

Knowing that yoga is understood as the ideal way of living a fruitful life, it should be noted that yoga isn't an alternative to medicines, it more like a precautionary measure to keep the viruses away and tries fighting them before it damages the body.

Today, we are going to understand how pranayama helps to boost the immune system.

Pranayama is all about different breathing techniques and how different types of breathing exercises help us in different ways.

How does Pranayama help boost the immunity system?

As stated, pranayama is a category in yoga focusing on breathing exercises. The common benefit is that through these breathing exercises, a huge amount of oxygen is inhaled, which helps in the making of cells. Now, as you might know, that cells are regenerated continuously in our body, and oxygen is an important element in the process of regeneration of cells. The simple act of breathing is the fastest and most efficient way to receive oxygen into our bodies.

The better the air quality and the deeper you breathe the more you can help your immune system work properly. Routinely practising pranayama boosts overall immune system.

Pranayama (Breathing Techniques) To Improve Immune System

Yogic breathing is known as Pranayama (Breathing Techniques). Stress is one of the most serious reasons for poor immune system. When you are stressed out your internal environment is unbalanced and bacteria and viruses start attacking the body. Pranayama (Breathing Techniques) reduces stress levels and fight against anxiety to boost immune system. Through Pranayama (Breathing Techniques) we control our breathing elongating the inhales and exhales which help to improve our nervous system, provide more oxygen in our blood and anxiety levels begin to abate. Consequently our body automatically re-balance and restore immune system.

There are mainly 5 Pranayama (Breathing Techniques) to boost your immune system.

1. Bhramari Pranayama (The Humming Bee Breathing Technique)
2. Kapalbhati Pranayama (Forehead Shining Breathing Technique)
3. Anuloma Viloma Pranayama (Alternate Nostril Breathing Technique)
4. Bhastrika Pranayama (Bellow Breathing Technique – Breath of Fire)
5. Udgeeth Pranayama (Chanting Breathing Technique)

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Benefits Of Pranayama

- Pranayama is known to improve the functions of the immune system and boost immunity.
- It works on the overall health of your body and builds on strengthening cells, tissues, and glands in our system.
- Helps in removing heart blockages and cures serious heart problems.
- It wards off any stress, anxiety, and depression from your mind by relaxing your nerves.
- It improves oxygenation and blood flow in the body.
- And is also known to combat diseases like migraine, asthma, gastric issues, neurological problems, etc.
- Pranayam Aasans For Better Immunity

What Does Pranayama Do To Our Immune System?

- Repeated deep breaths will increase your heart rate, it will improve your nervous system and immunity.
- A study has proven that pranayama reduces inflammatory markers like C-Reactive Protein that suppresses our immune system.
- Pranayam improves our sleep, which would lead to a good immune system.
- Consistent practice of pranayama increases the oxygen levels in the body and harmful cells cannot survive in an oxygen-rich environment.
- Pranayama increases endorphins levels which is a happy hormone.

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MEDITATION

Meditation for the Immune System

A recent review studied the effects of meditation and mindfulness on the immune system and found some amazing results. The results highlighted that meditation:

- Increased the number of CD-4 cells, which are the immune system's helper cells that are involved in sending signals to other cells – telling them to destroy infections.
- Reduced markers of inflammation, high levels of which are often correlated with decreased immune functioning and disease.
- Increased telomerase activity; telomerase helps promote the stability of chromosomes and prevent their deterioration (telomerase deterioration leads to cancer and premature aging).

In another eight-week study, researchers at UCLA had 50 HIV-positive men meditate daily for 30-45 minutes. Doctors found that, compared with a control group, the more training sessions the men attended, the higher their CD-4 cell count at the conclusion of the study.

Both these studies have shown that regular meditation practice can improve immune system functioning and keep you healthier.

What are the Benefits of Meditation on Immune Health?

New research suggests that mindfulness meditation can have benefits for health and performance, including improved immune function, reduced blood pressure and enhanced cognitive function.

Essentially, when you're practicing mindfulness meditation – paying attention to the present moment without judgment – your body naturally responds by calming down. That enables your immune system to do what it needs to do to take care of you.

A study, published in the latest issue of the journal *Perspectives on Psychological Science*, draws on existing scientific literature to attempt to explain the positive effects of meditation. The goal of this work is to unveil the conceptual complexity of mindfulness, providing the big picture by arranging many findings – like the pieces of a mosaic.

Four key components of mindfulness were identified and may account for the positive effects people experience when they commit time and effort to the practice of quieting the mind.

These include:

- Attention regulation
- Body awareness
- Emotion regulation

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- Sense of self

Together, these help people deal with the effects of stress and allow the mind and body to interact in a manner that begins both spiritual healing and physical rejuvenation. The direct benefits of which can include:

- Improved heart functionality
- Decreased cognitive decline
- A boost in natural antibodies
- Reduced pro-inflammatory gene expression
- Reduced cell aging

While these specific areas of immunity-boosting have been displayed in recent research, the fact of the matter is meditation and mindfulness has been practiced for centuries for a reason. There is viable evidence that practicing meditation helps boost your defense against all manners of disease, including addiction, and fosters wellness within the spirit and the body.

A Mindfulness Meditation to Boost Your Immune System

Mindfulness meditation has been shown to improve attention regulation, body awareness and emotional regulation, positively effecting a person's overall well-being and physical health. Research also suggest mindfulness can help improve immune functioning — boosting your body's natural defense system.

One of the most popular meditation techniques, mindfulness is the practice of paying close attention to the present moment without judgement. It's the art of tuning in to your immediate experience and accepting whatever thoughts, feelings and bodily sensations arise moment-to-moment. Calming your mind and body, practicing mindfulness is an exceptional tool for stress reduction; and mindfulness-based therapy interventions have been shown to reduce symptoms of anxiety and depression.

All of these factors enable your immune system to function more optimally and provide better protection for your health, especially when you consider chronic stress' negative impact on immune health. Additionally, a growing body of research indicates that practicing mindfulness meditation helps boost your immune system for better defenses.

- Starting with something as simple as a body scan, where you progressively relax each part of your body while lying on the floor or your bed.
- Begin by taking a few deeper breathes, exhaling through your mouth as you settle in.
- Then bring your attention to your feet. Inhale, and as you exhale, feel your heels release into the floor or bed.
- Next, notice the backs of your calves resting on the floor. Inhale, and as you exhale, allow your calves to become heavier into the floor or bed.
- As you're ready, feel the backs of both of your thighs against the floor or bed. Inhale, and as you exhale, try to relax any tension you may feel in your thighs.

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- Now the muscles of your butt. Notice if you're holding any tension in the muscles of your butt and pelvic floor; and, on an exhale, relax your butt muscles and pelvic floor. This may take a few breathes.
- Continue to systematically work your way up your body, bringing your awareness to your low back, shoulders, arms, neck and head, and letting go of any perceived tension as you exhale.
- When you're ready, you can open your eyes if they happen to be shut. Move with a greater sense of mindfulness as you slowly sit up and make note of how you feel.

4 Crucial Ways Meditation Boosts Your Immune System

While we don't necessarily understand how meditation helps boost the immune system, scientific evidence overwhelmingly demonstrates that regular meditation can greatly assist your body in fighting off dangerous infections.

Of course, meditation won't cure disease on its own, and the best strategy for beating illnesses like COVID-19 is to prevent getting it in the first place by getting vaccinated. But if you do become sick with coronavirus or the flu, meditation can greatly strengthen your immune system's response in four key ways:

1. Increased B Cell Antibody Production (Humoral Immunity) and T Cell Protection

The most obvious benefits meditation has on your immune system can be seen at a cellular level. Your body produces a wide variety of cells that keep your immune system on track and fight off infection, and meditation has been seen to have an impact on some of the most important ones.

In a study conducted by Richard Davidson, a professor at the University of Wisconsin Madison, subjects were injected with a flu vaccine. Half of the subjects then received meditation and mindfulness training over the next eight weeks. At the end of the study, the meditation showed higher levels of antibodies that could respond to the illness. While COVID-19 is far more deadly than the flu, both are from a similar family of viruses, suggesting that meditation could be helpful in fighting coronavirus.

In another study conducted at UCLA, doctors had 50 HIV-positive men meditate daily for 30-45 minutes. When comparing them to a control group who did no meditation, the more training sessions attended correlated with a higher count CD-4 cells, a cell that manages the communication of the immune system by sending signals to other cells telling them to attack infections. Meditation has also been shown to increase T-Cells in patients with HIV or breast cancer, and the production of the protective interleukin-10 in colitis patients.

2. Improved Sleep Quality

Most of us have firsthand experience with how severe lack of sleep can make us drag physically and psychologically. Poor sleep quality can even affect us spiritually by not giving us the chance to replenish our psychic energy, making it more difficult to connect with our Higher Selves. We all know how challenging it

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can be to focus and stay productive while running on little sleep, but not getting 7-8 hours of rest can also lower your body's ability to fight off infection.

Consistent meditation is one of the best ways to help you sleep better, and sufficient rest is essential to keeping your immune system working at full function. Research suggests that severe loss of sleep can have the same effect on the body as prolonged stress by forcing your immune system to work overtime. When sleep-deprived, the subjects showed a lower number of white blood cells called granulocytes, and the authors also cited earlier studies that showed a lack of sleep increased the chances of high blood pressure, diabetes, and obesity.

3. Reduced Inflammation

Inflammation is a word generally associated with joint pain and arthritis, but it's actually your body's natural response that helps you heal wounds and fight infections which makes it a good thing. Of course, too much inflammation can cause heart, brain, cellular and tissue damage by forcing your body and immune system to work overtime, hindering the body's ability to mount a proper response to illnesses like the flu or corona virus. Chronic inflammation is a root cause of a host of other health problems as well, including cancer, heart disease, diabetes, stroke, and Alzheimer's.

A study from Carnegie Mellon University observed 35 stressed-out adult job seekers, and had half of them complete a three-day mindfulness meditation retreat while the other half completed a relaxation retreat component without meditation. Brain scans and blood samples before and after the program showed increased brain activity between the parts of the brain responsible for internal reflection and decision making, along with lower levels of Interleukin-6, an indicator of inflammation. Meditation has also been shown to reduce inflammation in rheumatoid arthritis patients, further demonstrating that inflammation levels, and therefore your immune response, can be greatly benefited by meditation.

4. Lower Stress Levels

Staying calm and mindful in difficult times is no easy task, but it is during stressful and challenging times that it's the most important to commit to a regular meditation practice. When we're stressed, our body's natural "fight or flight" response begins to kick in. We've all experienced the chemical effects of this: our heart starts racing, our palms begin to sweat, and it's difficult for us to think about anything other than the source of our stress. This can be a beneficial reaction when confronted with physical danger, but when we're regularly stressed out by everyday life, it can have seriously negative effects.

When we experience intense stress, our bodies automatically focus our energy on things that will help us avoid short-term danger. Things that have a longer-term impact on health, like digestion and the immune system, are suppressed. While short-term suppression of the immune system is not dangerous, prolonged suppression from chronic stress leaves the body vulnerable to illness and infection. Stress releases cortisol into the blood, which over the long term can cause unnecessary inflammation, and even reduces the number of lymphocytes

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— white blood cells that fight off viruses like colds, the flu, and coronavirus — in your body.

The reduction of stress levels is the most highly valued and universally acknowledged benefits of meditation. A psychiatrist at the Center for Anxiety and Traumatic Stress Disorders at Massachusetts General Hospital and an assistant professor of psychiatry at Harvard Medical School, claims that meditation is an obvious treatment for those suffering from anxiety: “People with anxiety have a problem dealing with distracting thoughts that have too much power. They can’t distinguish between a problem-solving thought and a nagging worry that has no benefit.”

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GOOD SLEEP

How Sleep Affects Your Immune System

It's a universal experience: you start to feel sick, and all you want to do is sleep. And yet, rest does not come.

"That's because when your immune system is fighting off a pathogen, your sleep quality is often not very good", A sleep medicine specialist at the VA Connecticut Healthcare System.

Sleep study results show that when someone has an acute illness, there's a decrease in rapid eye movement, or REM, sleep. REM sleep is believed to be the most restorative stage of sleep.

What's more, poor sleep can also increase your susceptibility to certain types of illness. "Studies have shown that those who chronically get less than seven hours of sleep a night are three times as likely to develop the common cold compared to those who routinely get eight hours or more of sleep."

Likewise, vaccine studies suggest that those who sleep less mount fewer antibodies to certain vaccines, including those for influenza and hepatitis A and B.

"When study participants were deprived of sleep for about four hours a night in the days preceding—and one to two days following—vaccination, they developed a significantly lower level of antibody titers compared to those who were not sleep-deprived."

Insomnia and its consequences

Insomnia is a condition in which a person is unable to fall asleep. A person with insomnia may present with the following symptoms:

- Feels sleepy and tired throughout the day
- Is always irritated
- Have problems in focussing on one thing and memorizing stuff

Lack of sleep in the long term may increase the risk of obesity, diabetes, and cardiovascular diseases. Sleep is also vital for a proper immune response; lack of sleep can weaken your immune system; it can increase the body's susceptibility to infection and hamper the ability to fight the illness.

Lack of sleep and immunity

Lack of sleep can affect your immune system. Studies show that people who don't get quality sleep or enough sleep are more likely to get sick after being

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exposed to a virus, such as a common cold virus. Lack of sleep also can affect how fast you get better if you do get sick.

The sleeping and feeding habits of all the animals, including humans, are governed by the circadian rhythm. The word circadian is taken from the Latin word "circa," which means day and "diem" means around. Circadian rhythm is a natural process that controls the sleep-wake cycle. The sleep-wake cycle is determined by complex interactions between the central nervous system, endocrine system, and the immune system.

During sleep, your body releases cytokines, which are essential for the regulation of the immune system. Cytokines are required in increased amounts when you are attacked by a pathogen or are under stress. The level of cytokines increase during sleep, and therefore lack of sleep hinders the body's ability to fight infections. This is also a reason why the body tends to sleep more while suffering from any infection.

According to the National Sleep Foundation, chronic sleep loss poses a potential risk to the immune system. Researchers compared white blood cell counts of 15 subjects under normal and severely sleep-deprived conditions.

In the first part of the study, 15 participants followed a strict 8-hour sleep schedule for a week. During the study period, they were exposed to 15 minutes of sunlight within 1 ½ hour of waking up and made to refrain from caffeine, alcohol, or medication during the last three days, to normalize their circadian cycle.

In the second part of the study, participants were subjected to 29 hours of continuous wakefulness period. After study completion, the white blood cell counts of the participants were compared, and it was found that a type of white blood cells known as granulocytes reacted to the sleep deprivation in a typical way of body's stress response, that too particularly at night.

So your body needs sleep to fight infections that are passed from one person to the next. Long-term lack of sleep also raises your risk of obesity, diabetes, depression, high blood pressure, stroke, and heart disease.

The best amount of sleep for most adults is 7 to 9 hours of good sleep each night. But more sleep isn't always better. For adults, sleeping more than 9 to 10 hours a night may result in poor quality of sleep, such as trouble falling or staying asleep.

For children, Sleep Medicine recommends different amounts of sleep for different age groups:

- Ages 4 to 12 months: 12 to 16 hours, including naps.
- Ages 1 to 2 years: 11 to 14 hours, including naps.

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- Ages 3 to 5 years: 10 to 13 hours, including naps.
- Ages 6 to 12 years: 9 to 12 hours.
- Ages 13 to 18 years: 8 to 10 hours.

To get quality sleep, it's important to go to bed and get up at about the same time every day. And make sure your bed and room are comfortable for sleeping.

NIH-funded study shows sound sleep supports immune function

Getting a consistent good night's sleep supports normal production and programming of hematopoietic stem cells, a building block of the body's innate immune system, according to a small National Institutes of Health-supported study in humans and mice. Sleep has long been linked to immune function, but researchers discovered that getting enough of it influenced the environment where monocytes – a type of white blood cell – form, develop, and get primed to support immune function. This process, hematopoiesis, occurs in the bone marrow.

What we are learning is that sleep modulates the production of cells that are the protagonists – the main actors – of inflammation. Good, quality sleep reduces that inflammatory burden.

To assess these mechanisms, researchers studied associations between sleep and monocyte production in humans and mice, which expanded on findings from prior mathematical models. They analyzed how sleep disruptions increased circulating levels of these immune cells and changed the environment in the bone marrow.

In a collaborative study 14 adults enrolled in the clinical research trial. They each participated in a six-week study arm that emulated getting enough sleep (about 7.5 hours each night) or that created sleep deficiency. To model sleep restriction, adults reduced their nighttime sleep by 1.5 hours – getting about 6 hours of sleep each night. Sleep conditions were separated by a six-week “washout” period, during which participants returned to their normal sleep patterns.

Morning and afternoon blood samples were collected during the fifth and sixth weeks for each sleep condition. Researchers found that when adults didn't get enough sleep, they had higher levels of circulating monocytes in the afternoon. They also had higher numbers of immune stem cells in the blood and evidence of immune activation.

“The stem cells have been imprinted, or genetically altered, under the influence of sleep restriction.” “The change isn't permanent, but they continue to self-replicate at a higher rate for weeks.”

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A higher production of immune cells creates a more homogenous immune environment, which can accelerate clonal hematopoiesis, an age-related condition that has been linked to increased risks for cardiovascular disease.

Prior studies have identified genetic mutations that drive the proliferation of hematopoietic stem cells. However, this study found that putting pressure on the hematopoietic system, in this case through sleep restriction, produced similar results without the driver mutations.

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HEAD & BODY MASSAGE

How to Boost Your Immune System Using Massage Therapy

Massage therapy has a diverse range of well-known benefits. It has been proven to help increase a person's range of motion, reduce stress, regulate coordination and even reduce anxiety. Aside from these benefits, it also exerts a beneficial effect on the immune system. Those who receive massage therapy undergo an endocrine response as well as note a change in their immune system. This is one of the reasons massage therapy treatments are considered an extraordinary way to promote immune health and general wellness.

It is a known fact that people who are in a constant state of stress will get sick more regularly. Those who are sleep deprived and have poor eating habits also suffer from a weakened immune system. When a person receives massage therapy sessions on a recurring basis, the benefits are more than simply therapeutic.

Can Your Immunity Get a Boost from Massage Therapy?

Massage therapy has most often been viewed as a luxurious activity, but as more studies emerge, they are developing into more. Instead of just an idle activity, massages are now a part of a healthy lifestyle. Today's hectic lifestyle places an enormous amount of stress on the body, emotions and even our psyche. Massage has already been proven to help de-stress those areas, but can it really boost our immune system. Recent studies indicate massage therapy treatments have proven effective in reducing the amount of vasopressin and cortisol that is in the body. It also helps to improve the flow of lymph and blood in your body which in turn increases the power of your immune system. Some benefits of improved lymph and blood flow are:

- Improved skin tone
- Better range of motion
- Healthier hair and nails
- Improved organ function and cell growth
- Higher white blood cell count
- Better heart function
- Higher energy levels
- Lower blood pressure
- More restful sleep
- Higher blood oxygen saturation
- Mental clarity

How Does Massage Therapy Help Improve Your Health?

Stress is one of the primary things that causes illness in the human body. Massage is a reliable way to relieve stress. When a person receives regular massage therapy treatments then their immune systems cytotoxic capacity increases. As a result, the immune system receives a timely boost. Your sleep cycle also plays a significant role in your health. Less sleep results in less time for your body to heal from environmental toxins, stress, and general wear and

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tear. Massage therapy helps to improve the sleep cycle, which in turn will enhance the health of your immune system.

How Can Massage Help?

There is an ever growing body of research that supports the benefits of Massage Therapy for the Immune System, especially during the winter months. Here are some reasons why regular treatments strengthen your immunity:

- Massage increases the activity of your white blood cells, the cells in your body responsible for combating viruses.
- Massage decreases cortisol, the stress hormone. High stress levels, whether physical or emotional, can lead to lack of sleep, depression and anxiety which often suppress our Immune System's response.
- Increased levels of Dopamine and Serotonin help to reduce anxiety and the release of these chemicals increases with Massage.
- Massage helps to decrease inflammation and cytokine secretion which has a direct impact in reducing symptoms of asthma, depression and diseases of the cardiovascular system.

When it comes to strengthening your immune system regular massage becomes a necessity rather than a luxury as it increases both your physical and mental well-being.

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HYDRATION

Benefits of Good Hydration

There are many powerful reasons why you should consider staying well-hydrated beyond supporting your immune system function. Hydration is at the core of how our bodies function, which means that the effects of dehydration extend far beyond increasing our risk of getting an upper-respiratory infection.

Here are some of the top reasons you should consider keeping your drinking water bottle topped off:

- Good hydration supports better skin health, specifically the thickness of your skin, elasticity of it, and ability to regulate the loss of moisture.
- Hydration reduces stress and tissue damage on the kidneys, allowing them to more easily extract waste.
- Water is critical for ensuring our bodies adequately regulate our temperature.
- Dehydration results in reduced endurance and increased mental and physical fatigue.
- Even moderate levels of dehydration can negatively affect mood.
- Adequate hydration can improve gastrointestinal function.
- Hydration can help individuals avoid a vasovagal response, such as syncope following a blood donation.

Closing Thoughts

Adequate hydration is key to supporting a healthy, functioning immune system. Water facilitates the transfer of nutrients between cells, helps your body eliminate waste efficiently, and is crucial for the healthy function of our body's organs and systems.

Alongside a healthy lifestyle that includes proper nutrition, sufficient exercise, and adequate sleep, good hydration is a critical tool for ensuring your body's immune system is functioning at its highest level. Supporting your immune system means eating good foods and drinking clean, filtered drinking water that is free from harmful contaminants.

How does water boost immunity?

Water plays a crucial role transporting nutrients between cells, helping our body eliminate waste efficiently, and facilitating detoxification. By fulfilling these functions, water helps support a healthy, well-functioning immune system.

However, it is also important to understand that staying well-hydrated is one part of maintaining a healthy and functioning immune system. Other actions people should take include:

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- Not smoking.
- Avoiding drugs and alcohol.
- Moderate, regular exercise. Studies have shown intense training can suppress immune system function.
- Eating nutritious foods like fruits and vegetables.
- Ensuring an adequate supply of micronutrients.

Water is essential for many biological and chemical processes in the body, including the immune system.

Here are three ways water can help boost your immunity:

Water helps flush out toxins

Toxins can accumulate in the body from various sources such as pollution, chemicals, and processed foods.

These toxins can weaken the immune system by causing inflammation and oxidative stress.

Drinking water helps flush out these toxins, reducing inflammation and improving the body's overall immune function.

Water supports lymphatic function

The lymphatic system is a network of vessels and tissues that helps remove waste and toxins from the body.

It also plays a vital role in the immune system by transporting immune cells and antibodies throughout the body.

Drinking enough water helps keep the lymphatic system functioning correctly, enhancing your immune system's ability to fight off infections.

Water helps maintain mucous membranes

Mucous membranes are the thin, moist tissues that line various organs in the body, including the respiratory and digestive tracts.

These membranes help protect against pathogens by trapping them and preventing them from entering the body.

Staying hydrated helps keep these membranes moist and enhances their protective function.

How much water do you need to boost immunity?

There is a popular misconception that we should drink about eight glasses of water per day.

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However, The National Academy of Medicine (NAM) recommends that men consume about 3,700 ml (approximately 15 glasses) and women 2,700 ml (approximately 12 glasses) of fluid per day, ranging from water, other drinks, and foods.

So, don't forget to hydrate!

Water and Immunity

Just like every other system in the body, the cells of your immune system require nutrients to do their job. Here are three main ways in which water supports immunity:

Water is essential for nutrient absorption.

Water is needed during the entire digestive process, particularly when it comes to nutrient absorption into the bloodstream. Once there, the nutrients are transported in this watery environment to all the body's cells, where they can be taken up and utilized.

Water is a key component of lymphatic fluid.

Water is an important component of another important fluid in your immune system, called lymph (or lymphatic fluid), which travels through a separate system of vessels.

The lymphatic fluid contains specialized white blood cells called lymphocytes that help the body fight infection. As the lymphatic fluid circulates, it helps remove waste products, toxins and impurities from your body – including bacteria and viruses. Since your lymph system is about 96 percent water, it should make sense that dehydration could slow down the function of this natural drainage system in your body.

Water helps maintain healthy mucous membranes.

Another way that water and fluids support immunity is by maintaining the health of your mucous membranes. Just as your skin helps to protect the outside of your body from foreign invaders, your moist mucous membranes act as a barrier, too. These membranes protect those areas inside your body that are exposed to air – like your nostrils, mouth and throat. When your body lacks adequate fluid, your nasal passages may become dry, making the barrier less effective.

Lastly, if you have an illness and have been coughing and have a dry throat, or if you have a fever, or if you've been losing fluids because of a stomach or intestinal upset, it's vitally important that you consume plenty of fluids to help your system recover.

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6 Tips to Help You Stay Hydrated

If you find it hard to drink enough water every day, here are some tips that might help you.

1. See it.

It can be really helpful if you can see the amount of water you plan to drink and track your progress over the day. Put the amount of water you plan to have in a pitcher on your kitchen counter or keep it at your desk. It will serve as a reminder to drink more, and you'll be motivated to sip on it as the day goes by – and meet your goal of finishing it.

2. Cool it.

Cold water often seems more refreshing than room-temperature water. Try stashing a bottle of water in your freezer and carry it with you during the day. It will stay cold for several hours, and you might be encouraged to drink more.

3. Wake up to it.

“Morning mouth” is a reminder that most of us are naturally a bit dehydrated in the morning. So keep a glass of water by your bed and drink it first thing – before your feet even hit the floor.

4. Flavor it.

Make your own spa water. Add a slice of fresh lemon or lime, some cucumber, a few berries, some fresh mint or a slice of fresh ginger to your water. It makes it feel special and adds a hint of refreshing flavor.

5. Eat it.

Don't forget that watery foods like fruits and vegetables (but particularly cucumbers, melons, tomatoes and leafy greens) contribute to your overall daily fluid needs, so include plenty of these healthy foods with meals and snacks.

6. Track it.

Just like keeping track of your calorie intake, keeping track of how much water you drink can help a lot, too. That's why the pitcher-on-the-desk trick works so well – at any moment, you can see how much water you've had and how much you need to drink before the day is over. If you want to go high tech, there are apps for your phone that can send you drinking reminders, keep track of your progress and even give you a virtual pat on the back when you've met your goal.

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HYGIENE

The hygiene hypothesis

The belief that a lot of cleaning and hand-washing weakens your immune system was probably born out of something called the hygiene hypothesis. This is the idea that kids who are exposed to more viruses, bacteria and other pathogens early in life build stronger immune systems.

“This idea comes from observations that some developing countries where kids might be exposed to more pathogens tend to have lower rates of certain diseases such as allergies and asthma.”

But there’s still debate around this hypothesis – and how much of a role personal hygiene plays. “Theoretically it makes sense, but there isn’t a lot of strong science behind it.”

It’s also not meant to be interpreted as a sweeping generalization that more germs and less cleanliness is better.

Proactively protect your immune health

Hygiene aside, there are many factors that play into how well-equipped your immune system is to fight infections. Some of those things are out of your control, such as age and genetics. But there are several things you can do to keep your defenses strong, including:

- **Find ways to cope with stress.** Stress causes your body to make a hormone called cortisol. Over time, cortisol can lead to inflammation and reduce your body’s ability to fight off infections.
- **Fuel-up smartly.** A well-rounded diet with ample amounts of fiber and healthy fats help keep inflammation at bay.
- **Keep moving.** Regular exercise helps keep your immune system running smoothly.
- **Get your Zzzs.** The average adult needs about seven to nine hours of sleep a night.
- **Avoid harmful substances.** Smoking and excessive drinking can weaken your immune system.

What can weaken our immune system?

During the COVID-19 pandemic we’re constantly being reminded to practise good hygiene by frequently washing our hands and regularly cleaning the spaces where we live and work.

These practices aim to remove or kill the coronavirus that causes COVID-19, and thereby minimise our risk of infection.

But there have been some suggestions using hand sanitiser and practising other hygiene measures too often could weaken our immune system, by reducing our body’s exposure to germs and with it the chance to “train” our immune defences.

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Some aspects of our modern lifestyle can weaken our immune system. These include:

- a lack of sleep
- certain medications and the overuse of antibiotics
- low vitamin D levels
- a Western diet rich in processed foods, and reduced consumption of fruits and vegetables
- a lack of physical activity
- stress and anxiety.

But there's no scientific evidence to support the notion that extra hygiene precautions will weaken our immune system or leave us more susceptible to infection by bacteria or viruses.

Microbes are everywhere: in the air, on food, and in plants, animals, soil and water. They can be found on just about every surface, including inside and outside your body.

The hygiene measures recommended during COVID-19 will help curb the spread of the corona virus and greatly reduce our risk of infection — but won't eliminate all microbes from our lives.

Six ways you can help your immune system

If you didn't have a functioning immune system, simply brushing your teeth would introduce enough harmful bacteria into your bloodstream to kill you. Luckily, your immune system protects you from these common, everyday bacteria.

Sight unseen, your immune system cells are constantly gobbling up bacteria and blocking viruses from invading your cells. Like your heartbeat or your digestion, the immune response is a function you don't control. But there are plenty of things you can do to lend a helping hand.

Good Hygiene

The first line of defense is to keep germs at bay by following good personal hygiene habits. Stop infection before it begins and avoid spreading it to others with these easy measures:

- Wash your hands with soap and water before preparing food and after using the bathroom.
- Cover your mouth and nose with a tissue when you sneeze or cough, or cough into your elbow rather than your hand.
- Wash and bandage all cuts. Any serious cut, or animal or human bite, should be examined by a doctor.

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- Do not pick at healing wounds or blemishes or squeeze pimples. Doing so allows germs to enter.

Vaccination

Many serious infections can be prevented by immunization. While some common side effects, such as a sore arm or low fever, may occur, vaccines are generally safe and effective. Consult your health care provider regarding your immunization status. In general:

- Children should receive the recommended childhood vaccinations.
- Adults should make sure their vaccinations are up to date.
- Travelers should get any necessary additional immunizations.

Food safety

Although most cases of food poisoning are not life-threatening, a few may lead to serious medical conditions, including kidney failure and meningitis. You can prevent most cases of food poisoning in your household by preparing and storing your foods safely. The following precautions will help kill germs that are present in the food you buy and help you avoid introducing new bugs into your food at home:

- Wash your hands with soap and water before and after each time you handle a raw food.
- Rinse all meat, poultry, and fish under running water before cooking. Rinse all fruits and vegetables under running water before cooking or serving them.
- Separate raw foods and cooked foods, and never use the same utensils or cutting boards with cooked meat that were used with raw meat.
- Cook foods thoroughly, using a meat thermometer to ensure that whole poultry is cooked to 180° F, roasts and steaks to 145° F, and ground meats to 160° F. Cook fish until it is opaque.
- Defrost foods only in the refrigerator or in the microwave.

Healthy travel

If you are planning a trip, ask your doctor if you need any immunizations. Discuss your travel plans with your physician at least three months before you leave. In addition:

- If you are traveling to an area where insect-borne disease is present, take and use an insect repellent containing DEET. In many tropical regions, mosquitoes can carry malaria, dengue, yellow fever, Japanese encephalitis, and many other serious infections. In many parts of the United States, ticks in meadows and woods carry Lyme disease or other diseases.

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- Avoid getting any unnecessary shots, immunizations, or even tattoos abroad. Needles and syringes (even the disposable ones) are reused in some parts of the world.

Clean water

Some countries do not follow stringent standards of water safety. If you have any doubt about the food or water while traveling, take these precautions:

- Do not consume ice while traveling. Freezing does not kill all infectious microbes.
- Drink only bottled drinks — such as soft drinks or bottled water — that have secure caps. Be aware that some fruit juices contain impure local water.
- Boil all tap water before drinking or drink only bottled water; use bottled or boiled water to brush your teeth.
- Do not eat uncooked vegetables, including lettuce; do not eat fresh, uncooked fruit you have not peeled yourself.
- Do not consume dairy products (milk may not be pasteurized).
- No matter where you are, avoid drinking untreated water from lakes and streams, which can contain disease-causing organisms from human or animal waste. If you must drink the water, bring it to a rolling boil for one minute to reduce the chance of infection.

Safe sex

The only sure way to prevent sexually transmitted diseases (STDs) is to not have sexual intercourse or other sexual contact. But the next best choice is to follow these safer sex guidelines:

- Engage in sexual intercourse only with one partner who has been tested and who is having sex only with you.
- Use a latex or polyurethane condom or a female condom every time you have sex.
- For oral sex, use a latex or polyurethane male condom or a female condom.
- For anal sex, use a latex or polyurethane male condom.

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HERBAL REMEDIES

Which are some natural herbs that help boost immunity

The monsoon season brings relief from the intense summer heat but also increases the risk of infections and illnesses. Damp weather and fluctuating temperatures create a breeding ground for bacteria and viruses. Thankfully, nature offers a variety of herbs that can enhance our immunity and keep us healthy.

In today's fast-paced world, maintaining a robust immune system is more crucial than ever. Ayurveda, the ancient Indian system of medicine, offers a holistic approach to health and well-being. Harnessing the power of nature, Ayurvedic herbs have been revered for centuries for their immune-strengthening properties. Let's explore Ayurvedic herbs that can help fortify your immunity and promote overall health.

Ashwagandha

Ashwagandha also known as the Indian Ginseng is one of the most common and important herbs of Ayurvedic medicine owing to its wide range of health benefits. It is used as a "rasayana" or herbal tonic from kids to the elderly to enhance immunity and increase longevity. This popular herb improves the body's defense against harmful pathogens by improving cell-mediated immunity. It also possesses antioxidant properties that also protect against cell damage caused by free radicals. Moreover, it also reduces the level of a stress hormone called cortisol thereby alleviating stress.

Giloy

Giloy or Guduchi is traditionally used in a wide variety of conditions for its combination of anti-oxidant, anti-inflammatory, immune-modulating, and liver-supportive actions. It is useful in building up the immune system and the body's defense against infections. It enhances the activity of macrophages (the cells responsible for fighting foreign bodies as well as microorganisms) and thus helps in early recovery. It is also an anti-inflammatory and antipyretic (that reduces fever) herb. Giloy produces its anti-inflammatory effect by blocking the effect of inflammatory chemicals like histamine and bradykinin. This helps in controlling non-specific allergic reactions in the body.

Amla

Amla is a rich source of vitamin C, B complex and antioxidants. These nutrients flush harmful toxins from the body and help fight the harmful free radicals. The presence of anti-inflammatory compounds in amla helps in lowering the levels of inflammation in the body and thus, preventing infections. It also contains immune-enhancing properties, which have a regenerative effect on the immune system and help fight infections better.

Tulsi

Tulsi has long been known as a plant loaded with medicinal properties. Well, this could be the reason why this plant is seen in many Indian households. It is rich

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in essential oils that are beneficial for the nervous system, immune system, and the antioxidant system. The antioxidant effect of tulsi protects all organs of the body from oxidative damage. These leaves act as an immunomodulator which means they play a key role in improving, maintaining, and boosting the production of antibodies and prevention of infections.

Mulethi

According to Ayurveda, Mulethi or licorice helps to fight infections by improving immunity due to its Rasayana (rejuvenating) property. Mulethi contains antimicrobial agents that detect and attack unwanted bacteria and germs, protecting you from sickness. The antimicrobial agent is called glycyrrhizin, which inhibits the growth of harmful microbes, further protecting you from diseases and infection. The enzymes present in the roots of the Licorice plant help in the production of lymphocytes and macrophages which are the body's natural defense against microbes, pollutants, and allergens.

Turmeric

The active compound in turmeric, curcumin, is known for its potent anti-inflammatory and antioxidant effects. These properties support the immune system by promoting a healthy inflammatory response. Including turmeric in your diet or opting for curcumin supplements can be a valuable addition to your immune-enhancing arsenal.

Ginger

Ginger is a common kitchen herb with potent anti-inflammatory and antioxidant effects. A study in the International Journal of Preventive Medicine found that ginger enhances the immune system by promoting the production of white blood cells, which are crucial for fighting infections. We can consume ginger tea or add fresh ginger to our soups and meals to reap its benefits. Ginger chews or candies can also be a convenient option.

Neem

Neem, often called the 'wonder tree,' has been used for centuries in traditional medicine for its immune-boosting properties. Research published in the Journal of Immunology Research highlights Neem's ability to enhance immune function by stimulating the production of immune cells and improving their response to pathogens. Neem leaves can be consumed directly or in the form of juice. Neem supplements are also available for those who prefer a more convenient option.

Can Drinking Tea Boost Your Immune System?

There are many tea varieties that may support your immune system's health. Popular options like green, black, white, and oolong tea all come from the same evergreen plant, *Camellia sinensis*.

As far as your immune system is concerned, antioxidants (like the flavonols in tea) can help protect your body against free radicals generated by pollution, cigarette smoke, and ultraviolet rays. Free radicals can have harmful effects on the body, including contributing to a weakened immune system.

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7 Types Of Tea That May Support Your Immune System

Green Tea

Mild, bittersweet green tea is a rich source of catechins. "Catechins are polyphenols that have an overall positive benefit to wellness and are notable antioxidants," Lee says. Epigallocatechin gallate (EGCG) is one of the most abundant and best-known catechins in green tea. It also offers perks for your immune system.

Research suggests that EGCG may also affect immune function in humans. In a more recent study, researchers took T cells from 20 healthy adult males and treated them with EGCG they'd isolated from green tea dissolved in water. They discovered that the EGCG prevented the T cells from creating pro-inflammatory proteins known as cytokines, which suggests that the plant compounds in green tea may help regulate the immune system.

Turmeric Tea

Turmeric is the vibrant yellow spice that gives curry its bold color, and it is also a popular type of herbal tea that may give your immune system a boost. "Research shows that turmeric can decrease inflammation and that it contains high levels of antioxidants, which both support overall immune function."

The primary active compound in turmeric is curcumin. According to research, curcumin effectively scavenges different types of free radicals, controls enzymes that neutralize free radicals, and helps prevent the creation of free radicals. Given the role that free radical damage can play in many diseases, the antioxidants in turmeric may make this spice a handy addition to your immunity-health diet.

Black Tea

The antioxidants in black tea may have unique effects on the immune system. For example, a past clinical trial found that healthy people (defined in this case as having no major illnesses and normal to mildly elevated systolic blood pressure) who drank three cups of black tea per day for six months showed increased immune activity.

Researchers looked at three markers that indicate that the immune system has kicked into gear: neopterin, kynurenine, and tryptophan. While black tea had no significant effect on neopterin or tryptophan levels, it did increase kynurenine, which suggests that the polyphenols in black tea help activate the immune response in healthy people.

White Tea

Thanks to its minimal processing, white tea is one of the lightest, most delicately flavored varieties on the market. Like its green cousin, white tea offers high

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levels of catechins. However, while white tea has antioxidant benefits similar to green tea, Lee notes that the antioxidant potential of green tea is still greater.

Robust human research on white tea and immunity is lacking, which is why this variety is lower on this list. But the minimal evidence we do have so far suggests that it may be worth a closer look in future literature. For example, an older test-tube study found that white tea extract helped tame inflammation caused by free radicals in human skin cells.

Ginger Tea

As a close relative of turmeric, ginger may also offer immunity-health benefits when sipped in a cup of tea.

Gingerol is the main active compound that's responsible for ginger's spicy, peppery flavor and medicinal properties. According to a prior review study, gingerol not only offers antioxidant and anti-inflammatory effects but may also help treat infections.

Few studies have looked at ginger's effects on the immune system or the effects of ginger tea in particular. More research is needed to conclude whether ginger tea can play a role in immune system health.

Chamomile Tea

Chamomile tea is more than just a calming beverage to consume before bedtime. Chamomile is an herb taken from the flowers of the Asteraceae plant family. People around the world have been using it as natural remedy for several health conditions since ancient times. Chamomile contains a variety of bioactive phytochemicals, notably flavonoids which function as antioxidants. It also contains small amounts of minerals and vitamins, such as potassium, calcium, carotene and folate, among other nutrients.

Hibiscus Tea

Last but not least, hibiscus tea is made from the brightly colored flowers of the hibiscus plant. The most common colors of the beautiful blooms are red-orange, pink, yellow, and white. The "calyx" is the part of the hibiscus plant that protects the bloom. Dried calyces are used in hibiscus tea, offering a refreshing yet tart flavor. In addition to providing antioxidant power, hibiscus tea contains small amounts of potassium, calcium, magnesium and other trace minerals.

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LIFESTYLE MODIFICATIONS

Healthy Habits: Enhancing Immunity

Overview

A healthy lifestyle offers many benefits, including helping to prevent heart disease, type 2 diabetes, obesity, and other chronic diseases. Another important benefit is that healthy routines enhance your immunity.

Your immune system fights everything from cold and flu viruses to serious conditions such as cancer. Immune systems are complex and influenced by many factors.

Vaccines, such as the flu vaccine, build immunity against specific diseases. You can also strengthen your immune system by eating well, being physically active, and maintaining a healthy weight. In addition, get enough sleep, don't smoke, and avoid excessive alcohol use.

Taking care of yourself will help your immune system take care of you. See six tips below.

1. Eat well

Eating well means emphasizing plenty of fruits and vegetables, lean protein, whole grains, and fat-free or low-fat milk and milk products. Eating well also means limiting saturated fats, salt, and added sugars.

Eating well provides multiple nutrients that support optimal immune function. However, too much of some vitamins and minerals can be harmful. Talk to your health care provider if you think you need nutritional supplements.

2. Be physically active

Regular physical activity helps you feel better, sleep better, and reduce anxiety. Combined with eating well, physical activity can help a person maintain a healthy weight.

Following the physical activity recommendations for your age provides immediate and long-term benefits. For example, being physically active may help lower your chances of dying from the flu or pneumonia. Emerging research also suggests that physical activity may potentially benefit immunity.

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3. Maintain a healthy weight

Obesity, defined as a body mass index (BMI) of 30 or more in adults, is linked to impaired immune functions.

Safe ways to help maintain a healthy weight include reducing stress, eating healthy foods, staying within your daily calorie needs, getting enough sleep, and engaging in regular physical activity.

Obesity may also lower vaccine effectiveness for numerous diseases, including influenza,⁸ hepatitis B and tetanus.

If you are concerned about your health, consult with your health care provider.

4. Get enough sleep

Scientific evidence is building that sleep loss can negatively affect different parts of the immune system. This can lead to the development of a wide variety of disorders.

See the recommended hours of sleep per day for your age.

5. Quit smoking

Smoking can make the body less successful at fighting disease. Smoking increases the risk for immune system problems, including rheumatoid arthritis.

6. Avoid too much alcohol

Over time, excessive alcohol use can weaken the immune system.

Increase immunity the healthy way

Many products on store shelves claim to boost or support immunity. But the concept of boosting immunity actually makes little sense scientifically. In fact, boosting the number of cells in your body — immune cells or others — is not necessarily a good thing. For example, athletes who engage in "blood doping" — pumping blood into their systems to boost their number of blood cells and enhance their performance — run the risk of strokes.

Attempting to boost the cells of your immune system is especially complicated because there are so many different kinds of cells in the immune system that respond to so many different microbes in so many ways. Which cells should you boost, and to what number? So far, scientists do not know the answer. What is known is that the body is continually generating immune cells. Certainly, it

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produces many more lymphocytes than it can possibly use. The extra cells remove themselves through a natural process of cell death called apoptosis — some before they see any action, some after the battle is won. No one knows how many cells or what the best mix of cells the immune system needs to function at its optimum level.

Immune system and age

As we age, our immune response capability becomes reduced, which in turn contributes to more infections and more cancer. As life expectancy in developed countries has increased, so too has the incidence of age-related conditions.

While some people age healthily, the conclusion of many studies is that, compared with younger people, the elderly are more likely to contract infectious diseases and, even more importantly, more likely to die from them. Respiratory infections, including, influenza, the COVID-19 virus, and particularly pneumonia are leading causes of death in people over 65 worldwide. No one knows for sure why this happens, but some scientists observe that this increased risk correlates with a decrease in T cells, possibly from the thymus atrophying with age and producing fewer T cells to fight off infection. Whether this decrease in thymus function explains the drop in T cells or whether other changes play a role is not fully understood. Others are interested in whether the bone marrow becomes less efficient at producing the stem cells that give rise to the cells of the immune system.

A reduction in immune response to infections has been demonstrated by older people's response to vaccines. For example, studies of influenza vaccines have shown that for people over age 65, the vaccine is less effective compared to healthy children (over age 2). But despite the reduction in efficacy, vaccinations for influenza, COVID-19 and *S. pneumoniae* have significantly lowered the rates of sickness and death in older people when compared with no vaccination.

There appears to be a connection between nutrition and immunity in the elderly. A form of malnutrition that is surprisingly common even in affluent countries is known as "micronutrient malnutrition." Micronutrient malnutrition, in which a person is deficient in some essential vitamins and trace minerals that are obtained from or supplemented by diet, can happen in the elderly. Older people tend to eat less and often have less variety in their diets. One important question is whether dietary supplements may help certain people maintain a healthier immune system.

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PATHOLOGY TESTS

The Connection Between Full Body Health and Immune Function

Our immune system is our body's tireless defender, constantly on guard against a barrage of invaders like viruses, bacteria, and parasites. Taking care of your body as a whole has a profound impact on your immune system's ability to keep you healthy. As we navigate a world with growing health challenges, the crucial link between full body health and immune function emerges as a focal point. Comprehensive health checkups play a pivotal role in unveiling potential issues, with a particular emphasis on immune function. They can identify issues early on, which could hinder the optimally functioning of your immune system.

Holistic Approach in Full Body Checkups

We often seek medical attention when the discordant notes of illness hit us hard. Coughs, fevers, fatigue – these are the signs urging us to address the immediate discomfort. This is where the power of full-body checkup lies. They offer a holistic perspective, delving beyond symptoms to examine the intricate relationships between various aspects of our health, including those fundamental to immune function. Blood tests, for example, can assess vitamin and mineral levels, which are crucial fuel for immune cells. Inflammation, another key player in immunity, can also be assessed using blood tests. These diseases or deficiencies in our bodies quietly disrupt the harmony of our immune system.

Key Indicators in Full Body Health Checkups

The comprehensive full-body checkups majorly include the following tests for immune health:

- Complete Blood Count With ESR
- Vitamin D, B12 and magnesium (Mg)
- C-reactive protein (CRP)
- Immunoglobulin E (Total IgE)
- Thyroid Function Test (TFT)

These metrics serve as valuable insights, unveiling potential vulnerabilities and guiding us towards tailored interventions for a more robust defense.

White Blood Cell Count (WBC): A complete blood count (CBC) test evaluates the 3 types of cells found in the blood, red blood cells, white blood cells (neutrophil, eosinophil, basophil, lymphocyte, monocyte), and platelet. Abnormally low levels (leukopenia) or specific imbalances in WBCs can indicate infections, inflammation, or immune disorders. Understanding your baseline WBC profile and monitoring changes becomes vital for early detection and intervention.

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Inflammation Markers: Chronic inflammation is seen in conditions like autoimmune diseases and cancers, which affect the immune system. Markers like C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) can reveal hidden fires, prompting further investigation into underlying conditions. Addressing these issues becomes key to calming the inflammatory storm and strengthening your immune defenses.

Nutrient Levels: Essential vitamins and minerals like vitamin D, zinc, and iron act as fuel for immune cells. Deficiencies, often masked by subtle symptoms, can leave your defenses vulnerable. Measuring these nutrient levels through blood tests helps identify and address gaps, ensuring your immune system has the resources it needs to function optimally.

These key indicators empower you to make informed choices about diet, exercise, stress management, and preventive care and act as guidance for tailoring interventions to build a stronger, more resilient inner defender.

What disorders and diseases can affect the immune system?

Conditions that can interfere with the normal workings of your immune system include:

Allergies. An allergy is your body's reaction to a substance that's normally harmless. Your immune system overreacts to the presence of that substance, leading to a range of symptoms from mild to severe.

Autoimmune diseases. These conditions occur when your immune system attacks its own healthy cells by mistake. Lupus and rheumatoid arthritis are examples of common autoimmune diseases.

Primary immunodeficiency diseases. These inherited conditions prevent your immune system from working properly. They make you more vulnerable to infections and certain diseases.

Infectious diseases. Infectious diseases happen when germs enter your body, replicate and cause damage. HIV and mononucleosis (mono) are examples of infectious diseases that weaken your immune system and can lead to serious illness.

Cancer. Certain types of cancer, like leukemia and lymphoma, can weaken your immune system. That's because cancer cells may grow in your bone marrow or spread there from somewhere else. Cancer cells in your bone marrow interfere with the normal production of blood cells you need to fight infection.

Sepsis. Sepsis is an extreme immune response to infection. Your immune system starts damaging healthy tissues and organs. This causes potentially life-threatening inflammation throughout your body.

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Reasons to have a blood or pathology test

Apart from detecting and diagnosing disease, blood and pathology tests are important for:

- treating disease
- monitoring disease progression
- preventing disease (for example, a Pap smear or mammogram may reduce the risk of some common women's cancers through early detection)
- determining future risk of disease (for example, looking at cholesterol levels or the risk of inherited conditions such as familial breast cancer)
- aiding research into new treatments, and safety of treatments and procedures.

If your doctor or specialist sends you for blood and pathology tests, it's because there's some concern about your health (or you're at an age where health risks may be more likely) and a test is an effective way of discovering whether there's a problem. You may be sent for blood and pathology tests to:

screen for disease – screening may pick up a disease in its early stages, sometimes even before you're aware you have it, or a genetic or inherited disorder

look for potential health risks – many risks to your health, such as diabetes, heart disease, or rheumatoid arthritis, can be detected with blood and pathology tests. Your doctor will look at your health history (such as age, weight, lifestyle and family history of disease) and your test results to assess your health risk

diagnose an illness – if you're sick, your doctor may need test results to pinpoint the cause, and make an accurate diagnosis and treatment plan

give a prognosis – if you have a disease, blood and pathology tests can help your doctor determine your prognosis (likely health outcome or course of your disease). If you have cancer, your doctor would use tests to work out the stage your disease has reached

prepare for treatment – your doctor may need to take a blood test to determine your blood type before surgery or transfusion, for example

monitor your illness or medications – your doctor will order tests to work out whether your illness is getting better or worse or remaining stable. They may also want to assess medication levels in your blood and the effects of some medications on your organs, for example.

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10 important blood tests

1. Complete blood count

A routine complete blood count (CBC) checks for levels of different components in your blood.

Based on your results, your doctor will order follow-up tests to confirm abnormal levels and a possible diagnosis.

2. Basic metabolic panel

A basic metabolic panel usually checks for levels of eight compounds in the blood:

- calcium
- glucose
- sodium
- potassium
- bicarbonate
- chloride
- blood urea nitrogen
- creatinine

This test may require you to fast for at least 8 hours before your blood is drawn, depending on the instructions of your doctor and what the test is measuring.

3. Comprehensive metabolic panel

A comprehensive metabolic panel (CMP) includes all the measurements of a BMP as well as additional proteins and substances related to liver function, such as:

- albumin, this is the main protein in your blood. It's made in your liver.
- total protein, this is the total amount of protein in your blood. It includes albumin and globulins, which are mainly made in your liver.
- alkaline phosphatase (ALP), an enzyme mostly found in the bones and liver that's involved in several bodily processes
- alanine aminotransferase (ALT), an enzyme found in the liver
- aspartate aminotransferase (AST), an enzyme found in the liver and other tissues within the body
- bilirubin, which is waste resulting from the breakdown of red blood cells that the liver filters out

4. Lipid panel

This test checks levels of two types of cholesterol:

- high-density lipoprotein (HDL), or "good" cholesterol

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- low-density lipoprotein (LDL), or “bad” cholesterol

You may need to fast for at least 8 hours before this test.

HDL cholesterol levels of 60 milligrams per deciliter (mg/dL) or above are considered to be heart-healthy, while under 40 mg/dL is a major risk factor for heart disease. For LDL cholesterol, 100 mg/dL or below is optimal for good health, while 160 mg/dL or over is dangerously high.

5. Thyroid panel

A thyroid panel, or thyroid function test, checks how well your thyroid is producing and reacting to certain hormones, such as:

- **Triiodothyronine (T3):** Along with T4, this regulates your heart rate and body temperature.
- **Thyroxine (T4):** Along with T3, this regulates your metabolism and how you grow.
- **Thyroid-stimulating hormone (TSH):** This helps regulate the levels of hormones your thyroid releases.

Your thyroid is a tiny gland in your neck. It helps regulate bodily functions like your mood, energy level, and overall metabolism.

Abnormal levels of these hormones can indicate underactive thyroid (hypothyroidism) or overactive thyroid (hyperthyroidism).

6. Cardiac biomarkers

Common markers include:

- **High-sensitivity cardiac troponin (hs-cTn):** This is a heart protein that is a marker of heart injury.
- **B-type natriuretic peptide (BNP) and N-terminal pro b-type natriuretic peptide (NT-proBNP):** BNP is a hormone that is released when the heart muscle is stretched, generally caused by fluid overload in congestive heart failure.
- **Creatine kinase (CK):** This enzyme is primarily located in the brain, heart, and skeletal muscle. When muscle damage happens, CK seeps into the blood in growing amounts.
- **Creatine kinase-MB (CK-MB):** These enzymes are found in your heart. They often increase in your blood after a heart attack or other heart injury.

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7. Sexually transmitted infection tests

Many sexually transmitted infections (STIs) can be diagnosed using a blood sample. These tests are often combined with urine samples or swabs of infected tissue for more accurate diagnoses.

Blood tests aren't always accurate right after contracting an infection. It can take three to six months after exposure to get a positive blood test. This is why it is important to repeat testing.

8. Coagulation panel

Coagulation tests measure how well your blood clots and how long it takes for your blood to clot. Examples include the prothrombin time (PT) test and fibrinogen activity test.

Clotting is a crucial process that helps stop bleeding after a cut or wound. However, a clot in a vein or artery can be deadly since it can block blood flow to your brain, heart, or lungs. This can cause a heart attack or stroke.

Coagulation test results vary based on your health and any underlying conditions that may affect clotting.

9. DHEA-sulfate serum test

The dehydroepiandrosterone (DHEA) hormone comes from your adrenal glands. This test measures whether it's too high or too low.

In men, DHEA helps develop traits like body hair growth, so low levels are considered abnormal.

In females, high levels can cause typically male traits, like excess body hair, to develop, so low levels are normal.

10. C-reactive protein test

C-reactive protein (CRP) is made by your liver when tissues in your body are inflamed.

The higher the level, the higher the risk of heart disease:

- <0.3 mg/dL: normal
- 0.3 to 1.0 mg/dL: minor elevation can be associated with a person's sex, high body mass index (BMI), or with conditions like depression or insomnia
- 1.0 to 10.0 mg/dL: moderate elevation usually caused by systemic inflammation, such as from an autoimmune disease, bronchitis, heart attack, or cancer

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- >10.0 mg/dL: marked elevation typically caused by a serious bacterial or viral infection, major trauma, or systemic vasculitis
- >50.0 mg/dL: severe elevation usually caused by an acute bacterial infection

Smoking and gingivitis may also be linked with heart disease. More and more evidence suggests a link between oral health and overall inflammation.

What are immunological tests?

Certain substances or pathogens (germs) can be detected with the help of immunological tests. These things include viruses, hormones and the blood pigment hemoglobin.

They can be used for very different purposes, such as detecting viral infections, checking whether someone has an allergy, discovering colorectal cancer early or finding out if you're pregnant. The tests are used for routine testing in hospitals and laboratories, as rapid tests in test centers or at home, and in family doctors' and specialists' practices.

What are immunological tests used for?

Immunological tests are widely used. Their areas of application include:

Allergy tests: These tests are used to detect antibodies against allergy-triggering substances like grass pollen or certain foods.

Determining your blood group: When blood transfusions are done, the person donating the blood and the person receiving the blood have to have the same blood group. Immunological tests can be used to determine the blood groups before a blood transfusion.

Bowel cancer screening: This test looks for the blood pigment hemoglobin, which is a sign of blood in stool. Blood in stool can be caused by various things, such as an inflammation of the lining of the stomach (gastritis), hemorrhoids, polyps or bowel cancer.

Diagnosing heart attacks and thrombosis: Shortly after a heart attack or if someone has thrombosis, higher levels of a certain protein are found in the blood. These can be detected using an immunological test.

Rapid tests for drugs and medication: Immunological tests can also be used to look for recreational drugs such as cannabis, ecstasy and cocaine. Medical drugs that affect the central nervous system can be detected in this way too. These include sleeping pills (benzodiazepines), amphetamines and morphine.

Detecting germs that are causing an infection: If it is thought someone has bacterial tonsillitis or scarlet fever, the test looks for Streptococcus bacteria. In

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the case of Lyme disease following a tick bite, there are tests that can detect the Borrelia bacteria that cause it, and there are tests that can detect the antibodies to Borrelia bacteria. Immunological tests can also be used to detect viruses. Examples include SARS-CoV-2 (COVID), hepatitis C, HIV and HPV viruses. Pregnant women can have a blood test to find out whether they are protected from (immune to) toxoplasmosis.

Pregnancy test: Women can use this rapid test to find out whether their urine contains the "pregnancy hormone" beta-hCG.

Urine test: If sugar, blood, proteins or inflammatory cells are found in urine using this rapid test, it could be a sign of diabetes, a urinary tract infection or kidney damage.

Immunological tests can also be used to diagnose congenital or acquired diseases of the immune system, differentiate between different forms of rheumatoid arthritis, or monitor the progression of an existing medical condition, such as certain types of cancer (in prostate cancer the PSA levels in blood are monitored).

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15 VACCINES

How Vaccines Work: Immune Response and the Body's Reaction

Vaccines can train your body to prevent sicknesses before they even start. They do this by introducing something called an antigen into the body, which imitates an infection and primes the immune system to respond. That way, if you encounter certain disease-carrying organisms, known as pathogens, in the future, your body already has a plan of attack.

"After a vaccination—and once the antigen is recognized as foreign by surrounding cells—it sets a cascade of events in motion that may help provide protection against disease." "The body's first line of defense, the innate immune response, is triggered almost immediately."

Modern immunizations have stamped out smallpox. They've nearly ended polio. And they've brought certain diseases such as measles to historic lows. Vaccines also helped change the course of the global COVID-19 pandemic.

How Vaccines Work: A Simple Explanation

To understand how a vaccine immune response works, it helps to learn a little bit about immune-system cells called B-lymphocytes and T-lymphocytes, or B-cells and T-cells. B-cells produce antibodies that fight off infection. T-cells recognize and kill cells infected with a virus or other foreign cells, which can stop the infection from spreading. When a vaccine introduces an antigen into the body, those B-cells and T-cells get to work.

Because of that immune response, following immunization some people may experience mild symptoms for a day or two, such as a fever, chills, or feeling tired. That's because the body is acting as if it's fighting a mild form of the germ—not because it's infected. Fever is one example of the body's protective responses to fight a pathogen.

Vaccination, as well as natural infection, also help produce "memory" B- and T-cells. That means if you become ill in the future with the pathogen you're vaccinating against, your immune system is trained to protect you and prevent serious illness.

Types of Vaccines

All vaccines teach the immune system to create antibodies to help it fight off a particular pathogen. However, the method they use to accomplish this goal depends on the underlying vaccine technology. It's a particularly exciting time for vaccine technology. We are seeing the opportunities that may come from matching different pathogens to specific vaccine technologies and shifting from traditional vaccines to mRNA vaccines in some cases.

Traditional vaccines contain a version or part of the virus, bacteria, or other pathogen. It may be live but weakened, such as in the measles or chickenpox vaccines. Or, it might be dead or inert, such as in the pertussis (whooping cough) or tetanus vaccines.

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mRNA (messenger ribonucleic acid) vaccines don't contain any part of the pathogen. Instead, mRNA is a molecule that contains instructions that direct cells to make a protein, or a piece of a protein.

mRNA vaccines only became available to the public after 2020, but the technology has been in development for decades, as scientists worked to ensure that safe and effective vaccination was possible with this approach. These advances are particularly beneficial from a global health standpoint, as mRNA vaccines can potentially be produced more rapidly than traditional vaccines, in response to a new threat of infectious disease.

Vaccines strengthen the body's natural defenses

To be immune is to be partially or fully resistant to a specific infectious disease or disease-causing organism. A person who is immune can resist the bacteria or viruses that cause a disease, but the protection is never perfect.

Immunization is the process of being made resistant to an infectious disease, usually by means of a vaccine.

Immunity is protection against a disease, and it can be passive or active, natural or vaccine induced.

Active immunity comes from being exposed to a disease-causing organism.

- **Natural immunity** results from being infected by a disease-causing organism, whether the infection is symptomatic or not.
- **Vaccine-induced immunity** results from being exposed to killed or weakened bacteria or viruses—or even just important pieces of them—through vaccination.

Either way, active immunity takes longer to develop but lasts longer than passive immunity.

Passive immunity is provided by antibodies produced by another human being or animal.

- Full-term babies acquire passive immunity from their mother's antibodies during the final months of pregnancy.
- Patients can acquire passive immunity through antibody-containing blood products derived from human or animal sources.

Passive immunity provides protection that is immediate but fades within weeks or months.

Which is safer: Natural immunity or immunity after getting a vaccine?

Vaccines help your immune system fight infections faster and more effectively. When you get a vaccine, it sparks your immune response, helping your body fight off and remember the germ so it can attack it if the germ ever invades again. And since vaccines are made of very small amounts of weak or dead germs, they won't make you sick.

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Vaccines often provide long-lasting immunity to serious diseases without the risk of serious illness. Learn more about getting vaccinated .

Vaccines are much safer. Natural immunity happens after you get sick with a disease. But diseases can be serious — and even deadly. A vaccine protects you from a disease before it makes you sick.

Vaccines don't just protect you — they also protect the people around you

Did you know that some people — like infants and people with weak or failing immune systems (like people with HIV/AIDS or cancer) — may not be able to get many of the vaccines that protect us from serious diseases?

The good news is that when you get vaccinated, you're also protecting the unvaccinated people around you. This is called community immunity.

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