Parry Nutraceuticals

valensa

Boost your immunity. Stay healthy!

Immunity–What Is It?

Our immune system does a remarkable job of defending us against disease-causing micro-organisms. In common language, we could call them “Policemen in surveillance.”

The immune system is made up of two armies of cells: innate and acquired. Innate immune cells– called Natural Killer or NK cells– are the body's first line of defense. They quickly respond to foreign cells to fight infection, battle a virus, or defend the body against bacteria.

Our acquired immunity–also called adaptive immunity–uses T cells and B cells when invading organisms slip through that first line of defense.[1,2]

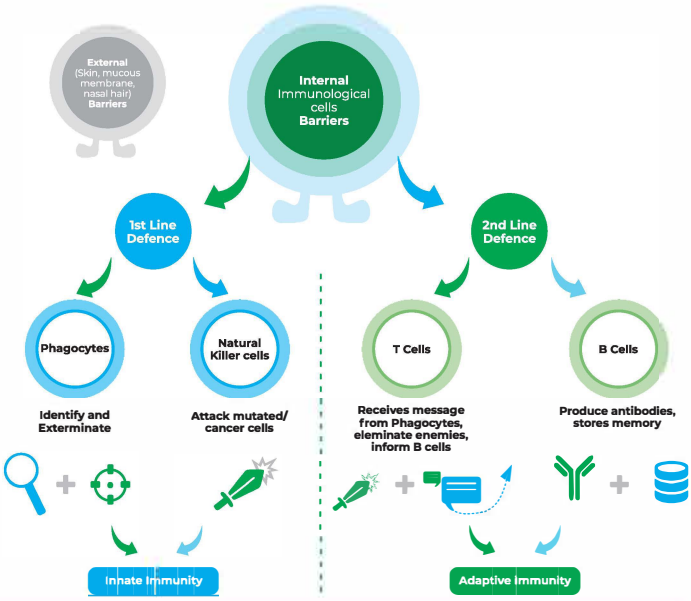
B cells and T cells:

Friends in Action B cells and T cells – also called lymphocytes– are produced and matured from the bone marrow and thymus, respectively. Other organs like the spleen, liver, lymph node, intestines, and lungs also produce immune cells and perform a balancing act when it comes to fighting against foreign invaders.[2]

B cells – or plasma cells – fight bacteria and viruses by making Y-shaped proteins called antibodies that are specific to each pathogen and work like a typical lock and key model to allow the antibody to clamp onto the antigen, triggering a cascade of events.[4]

T cells, on the other hand, are broadly differentiated into two types: Helper T cells and Killer T cells. Helper T cells stimulate B cells to produce antibodies and help Killer T cells to develop. T cells also use cytokines as messenger molecules to send chemical instructions to the rest of the immune system to ramp up its response.[2,3,4]

T cells and B cells work hand in hand when it comes to fighting a foreign antigen, whereas long-standing immunity develops when B cell activity manifests.



Inflammation: Is It Good or Bad?

The answer is it depends on the severity of the condition. Inflammation is the term used to define the characteristic appearance of swelling, pain, redness, and heat due to infection or injury, or non-living antigen infiltration (hay pollen inhalation, honeybee sting, snake bite, etc.)[4.] It's an outcome of antigen and antibody reactions, T cell cytokines, and vasoactive inflammatory mediators like histamine, prostaglandins, leukotrienes, and reactive oxygen species. Inflammation is a protective mechanism against foreign antigens, but prolonged activation due to dysregulation of immune cells could lead to chronic inflammation and organ damage with system failure.[2,4] Research has convincingly shown that chronically elevated systemic "low grade" inflammation is the reason for many Western lifestyle diseases.[6]

The Immune System – A Swiss Army Knife or a Double-Edged Sword?

Immune cells are vital for human survival, provided they are kept in control to only fight foreign antigens. The over activity or the hyperactivity of immune cells could cause collateral damage, like a war between the military and militants causing damage to the surrounding environment.[4,5]

Immune cells could be even more menacing when it comes to auto immunity.

As the name suggests, it is immunity against one's self. Examples are Crohn's disease, ulcerative colitis (immune cells attacking intestinal tissues), rheumatoid diseases (immune cells attacking cartilage, bones, and joint spaces), Lupus (immune cells attacking the connective tissues and kidneys)[2,5,] and the list goes on and on.

Yes, it is a double-edged sword to be handled carefully.

The Rising Concern...

With the growing evidence of population explosion and industrial revolution, we have put enough pressure on nature, and this has, in turn, affected our innate immune system. Adding to that fact, our sedentary lifestyle, unbalanced diet, irregular sleeping patterns, and chronic stress have caused more damage to the inner self than benefit.[3]

The immune system is extremely sensitive and can become activated, which can lead to erratic behavior ranging from the extreme ends of the spectrum:

- On one end of the spectrum – inefficiency in controlling antigens like bacteria and parasites
- On the other end of the spectrum – overactivity by excessive, non-specific production of cytokines and chemokines leading to allergy-like syndromes (hypersensitive reactions)

This era of global health burden from lifestyle diseases, infectious diseases, autoimmune diseases, and cancerous conditions have one thing in common – immuno pathogenesis.

How Can We Balance This Sensitive System?

Vaccines can boost the immune response against specific viruses and bacteria and prevent us from getting deadly infections of the past that challenged the very existence of human beings. Pharmaceutical drugs can protect us from infectious diseases and lifestyle diseases. Immuno suppressive drugs like corticosteroids, immune-modulatory agents, biologicals (monoclonal antibodies) can keep our autoimmune diseases under control.

Though all these solutions are imperative for our survival, which necessitates their use, should we only rely on these options every day?

Should we not also incorporate the ideologies of Hippocrates:

"Let thy food be thy medicine and thy medicine be thy food?"

Pharmacologists and clinicians increasingly realize that a "One Disease, One Target, One Drug" paradigm is coming up against limitations where it concerns the multifactorial diseases that are dominating our era.

Considering this challenge, healthcare practitioners have always encouraged people to consume a balanced, healthy diet everyday, despite the plethora of pharmaceutical resources[6].

Spirulina – A Wonder Food

In recent years, Spirulina has attracted scientific attention, not only for its various health benefits but also, at a micro-level of understanding, the mechanisms of action of its various components. In addition to being a "complete" protein source, Spirulina and its components have been shown to have positive benefits across a range of human health concerns from malnutrition to antioxidant properties.

Although few adverse effects of Spirulina supplementation have been reported, most of these can be addressed through organic production and good culturing, harvesting, and processing practices.[7]

Spirulina and Immunity

Various in vitro, in vivo, and ex vivo experiments have established Spirulina's mechanism of action and its beneficial effect on immunity. Spirulina has a two-for-one advantage for gut health. The phenolic compounds and extracellular metabolites released from Spirulina whole food after digestion is postulated to promote the growth of beneficial microorganisms in the gut microbiota (like Bifidobacterium and Lactobacillus) due to its free amino acids.[8]

Spirulina's Antibacterial Effects:

In in vitro studies Spirulina polysaccharide has favorable Minimum Inhibitory Concentrations (MIC) against pathogenic bacteria like Escherichia coli, Staphylococcus aureus, Bacillus, Streptococcus, and Salmonella typhimurium,[9,10,12] and direct bactericidal action against Salmonella typhimurium.[11] MIC and Minimal Bactericidal Concentration (MBC) are the gold standards for in vitro tests designed to determine a compound's antibacterial activity.

MIC and MBC dosages must then be extrapolated for direct administration in humans, which in turn depends on the bacterial growth curve and the patient's clinical condition, immune status, and co-morbid conditions.[14]

Spirulina's Antiviral Effects:

Spirulina also has proven in vitro and ex vivo benefits against viruses, such as Herpes simplex virus[28], influenza virus[15], and human immuno deficiency virus (HIV).[16]

One antiviral compound present in Spirulina is the polysaccharide. It has been shown to reduce the rates of viral infection and transmission in animal cells by blocking syncytium formation, a key step required for the fusion and internalization of virus particles into cells.

Another ingredient found in Spirulina is the intensely blue pigment called phycocyanin (phycobiliprotien). It has been shown to inhibit viruses, such as Enteroviruses and Retroviruses, based on plaque assays and the levels of cytopathic effects and RNA synthesis in cell cultures.[28]

Spirulina as an Immuno modulator

Various preclinical studies have shown that Spirulina and phycocyanin can block the release of allergen-induced cytokines, like IL-4, IgE, leukotrienes, prostaglandins, and chemo attractants. Unchecked, these cytokines can act non-specifically by damaging the body's tissues. Prolonged activation of IgE can also cause allergy-like symptoms in the respiratory tract and skin.

Phycocyanin also has antioxidant and anti-inflammatory properties, as shown by the reduction of glucose oxidase - induced inflammation in mouse paw.[28]

A different experiment in rats showed that Spirulina can inhibit allergen-induced histamine release and TNF α production by mast cells, which at a dose ≥ 500mg/kg, can prevent anaphylaxis and animal death.[17,18]

Shedding Some Light on Real-World Evidence

In a clinical study, 150 participants consumed 2000mg of Spirulina per day for six months, which significantly reduced their symptoms of allergic rhinitis (such as sneezing, itching, nasal discharge, and nasal congestion) compared to placebo.[19]

This study validates a similar study conducted by Mao et al. in 36 participants with allergic rhinitis, who were given 2000mg per day of Spirulina for 12 weeks.

The participants' peripheral blood was collected and assessed for IL-4, IFN-γ, and IL-2 cytokine levels.

Interestingly, Spirulina consumption reduced serum IL-4 levels. IL-4 is a critical cytokine involved in inducing type I hypersensitivity reactions by promoting IgE production in B cells, which can then sensitize an individual to an allergen by stimulating mast cells. However, the study showed no decrease in IFN-γ or IL-2 levels, which are secreted by T helper cells and serve as the inhibitory clamping mechanism in inflammatory pathways.[20]

Based on these antibacterial, antiviral, and immuno modulatory effects, Spirulina may be beneficial if consumed during seasonal weather changes.

In a study of patients infected with HIV-1, 82 participants who received 10grams of Spirulina plus balanced nutrition per day were compared to 87 participants who received balanced nutrition without Spirulina, for a period of 6 months. Both groups received standard antiretroviral therapy (ART), along with periodic monitoring of disease progression, CD4+ T cell count assays, and viral load (P24) determinations for 12 months.
The Spirulina/ART - treated patients showed significant improvements in CD4+ T cell levels compared to the non-Spirulina group during the later course of administration. They also had significantly reduced viral loads, substantiating the in vitro experiments in which Spirulina inhibited viral replication by reducing syncytium formation.[21]

Spirulina may bridge the gap by providing nutrients that were missing in the everyday diet.

A study conducted in 12 healthy volunteers showed that after several weeks of consuming 50ml of Spirulina mixed in water, the levels of Natural Killer (NK) cells in the participants' peripheral blood samples were significantly increased. The study also showed that digested Spirulina from the gut enters the bloodstream and pre-stimulates monocytes. Thereby an external antigenic insult could enable IL-12 secretion from these pre-stimulated myeloid cells, which increases the levels of NK cells, which then release IFN-γ27.

Despite being a small clinical study, it is worth dwelling on the implications that Spirulina may pre-stimulate innate immune cells to secrete IFN-γ the moment it is needed.

Dietary support programs have been successful in strengthening medical care and its health outcomes.[23,24,25] In particular, sustaining a high level of antioxidants in the body is essential for an efficient immune system, especially in the case of a chronic disease burden.

With antioxidant properties, immune-modulating mechanisms,antigenic inhibition, and anti-fatigue effects, Spirulina may be beneficial in enhancing recovery from the oxidative stress experienced in the cells, tissues, and the organs of the body.[13,14]

In summary, Spirulina is a functional food due to its many bioactive ingredients –phycocyanin (the hidden blue gem), calcium spirulan, polysaccharides, carotenoids (the gold)–that share antioxidant and immune-modulating properties, in addition to essential amino acids, vitamins, minerals, and other micronutrients.

Parry™ Organic Spirulina – High-Quality Spirulina is Essential

Because Spirulina is manufactured in open raceway ponds, inherent challenges include potential environmental contamination, algal toxins, and microbial contamination. The presence of such harmful substances can accumulate in the biomass and pose serious human health effects like diarrhea, vomiting, and liver damage.[7]

Parry Nutraceuticals has found an approach to circumvent this challenge – growing Spirulina in an 'organic' way, with strict protocol measures to ensure safety and compliance with **US FDA cGMP certification**.

The Organic Spirulina manufactured by Parry complies to the Organic standards worldwide such as **USDA NOP / EU** and is **FDA GRAS** and **Non GMO verified**. It was one of the first to be certified organic globally as per **USDA-NOP**, **Naturland** and **EU** Standards. It was also the first and only Spirulina to complete the **USP Dietary Ingredient Verification Program**, endorsed to align with the FDA's Food Safety Modernization Act.

This validates our commitment to quality and effective GMP quality systems in compliance with officially recognized requirements.

Parry follows certain cultivation and production practices using proprietary algae techniques based on three decades of experience, giving Parry's customers superior quality Spirulina products. Cultivation of Parry™ Organic Spirulina takes place in very conducive weather at the production facility in terms of light and temperature.

In addition, only certified organic vegetarian sources of nutrients are used to cultivate Parry's Spirulina, which is a highly favorable, healthy ecosystem to ensure maximum growth and nutrient content. Further, Parry uses a unique harvesting system to handle the algae cells in a gentle manner and stress-free environment to preserve vital nutrients to the finished product stage by applying environmental controls.

This results in the production of high-quality Spirulina with high levels of phycocyanin, calcium spirulan, carotenoids, essential amino acids, fatty acids, polysaccharides, vitamins, and minerals. Parry™ Organic Spirulina – quality you can count on.

Those who have no time for healthy eating will sooner or later have to find time for illness.

Edward Stanley

REFERENCES:

1. Rodwell VW, Bender DA, Botham KM, Kennelly PJ, WeilPA. Harper's Illustrated Biochemistry. 31st Edition. New York: McGraw-Hill Education; 2018.
2. Jameson JL, Kasper DL, Longo DL, Fauci AS, Hauser SL. Harrison's Principals of Internal Medicine.20th Edition. New York: Mc-Graw-Hill Education; 2018.
3. How to boost your immune system. Harvard Health website. https://www.health.harvard.edu/staying-healthy/how-to boost-your-immune-system. September 2014. Accessed April 6, 2020.
4. Abbas AK, Lichtman AH, Pillai S. Cellular and Molecular Immunology. 6th Edition. Philadelphia: Saunders Elsevier; 2007.
5. Kindt TJ, Goldsby RA, Osborne BA, Kuby J. Kuby Immunology. 6th Edition. New York: W. H. Freeman & Company; 2006.
6. Witkamp RF, van Norren K.Let thy food be thy medicine... when possible.Eur J Pharmacol. 2018 Oct 5;836:102-14.
7. Maddaly R, De SL, Azharuddin S, Paul SFD. The beneficial effects of spirulina focusing on its immuno modulatory and antioxidant properties. Nutr Diet Suppl.2010;2:73-83.
8. Rasmussen HE, Martínez I, Lee JY, Walter J. Alteration of the gastrointestinal microbiota of mice by edible blue-green algae. J Appl Microbiol. 2009 Oct;107(4):1108-18.
9. El-Sheekh MM, Daboor SM, Swelim MA, Mohamed S. Production and characterization of antimicrobial active substance from Spirulina platensis.Iran J Microbiol. 2014 Apr;6(2):112-9.
10. Ozdemir G, Karabay NU, Dalay MC, Pazarbasi B. Antibacterial activity of volatile component and various extracts of Spirulina platensis. Phytother Res. 2004 Sep;18(9): 754-7.
11. RafikaC, Trabelsi L, Ben Dhieb R, El Abed O, Yahia A, Ghozzi K, Ben Ammar J, Omran H, BenOuada H. Evaluation of cytotoxicity and biological activities in extracellular polysaccharides released by cyanobacterium Arthrospira platensis. Braz Arch Biol Technol. 2011;54(4):831-8.
12. Kaushik P, Chauhan A. In vitro antibacterial activity of laboratory grown culture of Spirulina platensis.Indian J Microbiol. 2008 Sep;48(3):348-52.
13. Juszkiewicz A, Basta P, Petriczko E, Machaliński B, Trzeciak J, Łuczkowska K, Skarpańska-Stejnborn A. An attempt to induce an immunomodulatory effect in rowers with spirulina extract. J Int Soc Sports Nutr. 2018 Feb 20;15:9.
14. Park HJ, Lee YJ, Ryu HK, Kim MH, Chung HW, Kim WY. A randomized double-blind, placebo-controlled study to establish the effects of spirulina in elderly Koreans. Ann Nutr Metab 2008; 52(4):322-8.
15. Chen YH, Chang GK, Kuo SM, Huang SY, Hu IC, Lo YL, Shih SR. Well-tolerated Spirulina extract inhibits influenza virus replication and reduces virus-induced mortality. Sci Rep.2016 Apr 12;6:24253.
16. Hayashi K, Hayashi T, Kojima I. A natural sulfated polysaccharide, calcium spirulan, isolated from Spirulina platensis: in vitro and ex vivo evaluation of anti-herpes simplex virus and anti-human immunodeficiency virus activities. AIDS Res Hum Retroviruses. 1996 Oct 10;12(15):1463-71.
17. Yang HN, Lee EH, Kim HM. Spirulina platensis inhibits anaphylactic reaction. Life Sci. 1997;61(13):1237-44.
18. Kim HM, Lee EH, Cho HH, Moon YH. Inhibitory effect of mast cell-mediated immediate-type allergic reactions in rats by Spirulina. BiochemPharmacol. 1998 Apr 1;55(7):1071-6.
19. Cingi C, Conk-Dalay M, Cakli H, Bal C. The effects of spirulina on allergic rhinitis. Eur Arch Otorhinolaryngol. 2008 Oct;265(10):1219-23.
20. Mao TK, Van de Water J, Gershwin ME. Effects of a Spirulina based dietary supplement on cytokine production from allergic rhinitis patients. J Med Food. 2005 Spring;8(1):27-30.
21. Ngo-Matip ME, Pieme CA, Azabji-Kenfack M, Moukette BM, Korosky E, Stefanini P, Ngogang JY, Mbofung CM. Impact of daily supplementation of Spirulina platensis on the immune system of naïve HIV-1 patients in Cameroon: a 12-months single blind, randomized, multicenter trial. Nutr J. 2015 Jul 21;14:70.
22. Winter FS, Emakam F, Kfutwah A, Hermann J, Azabji-Kenfack M, Krawinkel MB. The effect of Arthrospira platensis capsules on CD4 T-cells and antioxidative capacity in a randomized pilot study of adult women infected with human immuno deficiency virus not under HAART in Yaoundé, Cameroon. Nutrients. 2014 Jul 23;6(7):2973-86.
23. Rabeneck L, Palmer A, Knowles JB, Seidehamel RJ, Harris CL, Merkel KL, Risser JM, Akrabawi SS. A randomized controlled trial evaluating nutrition counseling with or without oral supplementation in malnourished HIV-infected patients. J Am Diet Assoc. 1998 Apr;98(4):434-8.
24. Fawzi WW, Msamanga GI, Spiegelman D, Wei R, Kapiga S, Villamor E, Mwakagile D, Mugusi F, Hertzmark E, Essex M, Hunter DJ. A randomized trial of multivitamin supplements and HIV disease progression and mortality. N Engl J Med. 2004 Jul 1;351(1):23-32.
25. Hummelen R, Hemsworth J, Reid G. Micronutrients, N-acetyl cysteine, probiotics and prebiotics, a review of effectiveness in reducing HIV progression. Nutrients. 2010 Jun;2(6):626-51.
26. Yakoot M, Salem A. Spirulina platensis versus silymarin in the treatment of chronic hepatitis C virus infection. A pilot randomized, comparative clinical trial. BMC Gastroenterol. 2012 Apr 12;12:32.
27. Hirahashi T, Matsumoto M, Hazeki K, Saeki Y, Ui M, Seya T. Activation of the human innate immune system by Spirulina: augmentation of interferon production and NK cytotoxicity by oral administration of hot water extract of Spirulina platensis. Int Immunopharmacol. 2002 Mar;2(4):423-34.
28. Mader J, Gallo A, Schommartz T, Handke W, Nagel CH, Günther P, Brune W, Reich K. Calcium spirulan derived from Spirulina platensis inhibits herpes simplex virus 1 attachment to human keratinocytes and protects against herpes labialis.J Allergy Clin Immunol. 2016 Jan;137(1):197-203.e3.

Parry Nutraceuticals

A division of E.I.D. - Parry (India) Ltd.,
Dare House, 4th floor, No. 234, N.S.C. Bose Road,
Chennai 600001, India.
enquiries@parry.murugappa.com
linkedin.com/company/parrynutraceuticals
www.parrynutraceuticals.com

valensa

VALENSA INTERNATIONAL
2751 Nutra Lane, Eustis, FL 32726
moreinfo@valensa.com
www.valensa.com