



**TAKING A HEALTHY
INTEREST IN**
**Immune
Health**

Vitafoods[™]
Europe



The global nutraceutical event

15-17 May 2018

Geneva

November 2017

3 Viewpoint

5 A Healthy, Growing Market

Although trends are constantly changing in the nutraceutical and functional food industry, immune health continues to show strong growth. **Colleen May** at Graminex investigates the market potential of the immune health category.

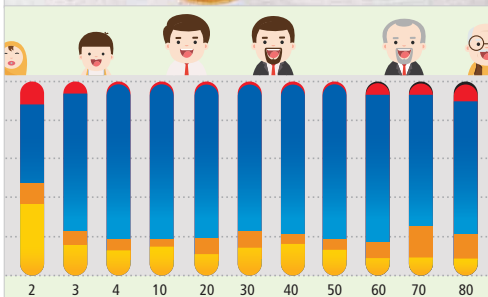
9 A Life Stage-Specific Approach to Probiotics for Immune Health

As both the immune system and digestive microbiota are established after birth, slowly mature, and evolve through life, a life stage-specific approach to probiotics for immune health is key to formulating effective immune support solutions. **Sylvie Roquefort** at Lallemand Health Solutions examines the research at each life stage.

17 The Immune and Inflammation Connection

Disease and infection have their chances of survival slashed when the body receives immune-boosting antioxidants. **Katie Self** explores the research supporting the role of antioxidants in immune health.

22 Takeaways



Copyright © 2017 Informa Exhibitions LLC. All rights reserved. The publisher reserves the right to accept or reject any advertising or editorial material. Advertisers, and/or their agents, assume the responsibility for all content of published advertisements and assume responsibility for any claims against the publisher based on the advertisement. Editorial contributors assume responsibility for their published works and assume responsibility for any claims against the publisher based on the published work. Editorial content may not necessarily reflect the views of the publisher. Materials contained on this site may not be reproduced, modified, distributed, republished or hosted (either directly or by linking) without our prior written permission. You may not alter or remove any trademark, copyright or other notice from copies of content. You may, however, download material from the site (one machine readable copy and one print copy per page) for your personal, noncommercial use only. We reserve all rights in and title to all material downloaded. All items submitted to Informa Exhibitions become the sole property of Informa Exhibitions LLC.

Natural Immunity

It's that time of year again: the leaves are turning, it's dark by 4 o'clock, the temperature is dropping and people everywhere are starting to snuffle and sneeze. To some—presumably those with a healthy immune system!—winter is a time of coziness; to others, it's a smorgasbord of germs and a time to turn to immune-boosting products.

Overall, the immune system does a remarkable job of defending us against diseases, and when it's working properly, we don't even notice it. But sometimes a particularly resilient germ manages to invade and the traditional pharma cold and flu products seem the only relief available. Savvy consumers, however, are turning to natural ingredients to combat their colds, and support their immune systems in every season. And it's not just the standard vitamin C supplement catching their eye; today's consumer knows all about the health benefits of elderberries, vitamin D and even cinnamon.

Although trends are constantly changing in the nutraceutical and functional food industry, immune health continues to show strong growth, with 25 percent of adults taking supplements for immune health. Beginning on [page 5](#), Colleen May investigates the market potential of the immune health category.

Research abounds on the gut microbiome impacting all areas of health, and it's well documented the gut harbours the majority of the body's immune cells. As both the immune system and digestive microbiota are established after birth, slowly mature and evolve through life, immunity appears one of the most logical areas to apply probiotics. On [page 9](#), Sylvie Roquefort examines the research at each life stage.

Specific ingredients addressing seasonal immune response are gaining consumer popularity, such as garlic and beta-glucan, but boosting overall immunity is vital throughout the year. The immune system requires a variety of nutritional compounds to function normally, including antioxidants such as selenium, vitamin E and zinc. Disease and infection have their chances of survival slashed when the body receives these immune-boosting ingredients, as Katie Self details on [page 17](#).

No one likes to be ill, and until there's a cure for the common cold, the market potential for the immune health category will continue to see healthy growth.



Jade Mitchell-Ross
Associate Editor, Vitafoods Insights

jade.mitchellross@informa.com

 @jmitchellross



M-GARD[®]

PURE IMMUNE STIMULATION

your best choice of yeast
beta-glucan for better
immune health

Visit us at stand F181 at
Vitafoods Europe 2018

m-gard.com

A Healthy, Growing Market

by Colleen May

With constantly changing trends in the dietary supplement and functional food and beverage markets, the category of immune health continues to show strong growth. According to a survey conducted by the Council for Responsible Nutrition, 25 percent of adults take supplements for immune health.¹ This continued interest is pushing manufacturers and suppliers of ingredients that support immune function to create safe, efficacious products. As science-driven natural ingredients trend across all markets, this stays true when looking at immune health. A search of SupplySide & Vitafoods Global Storefronts shows the immune health category contains the second highest number of listings. Three major trends are developing, beginning at the consumer level where purchasing trends still leave the majority of the market to traditional vitamin and mineral products. Despite this, a second rising trend among consumers is the willingness to explore novel delivery systems. Finally, in manufacturing and formulating, a higher level of due diligence in the selection of immune ingredients is being seen. The combination of these three trends is creating a diverse and growing immune health ingredient marketplace.

Understanding consumers' interest in the immune health category goes with the standard medical advice that having a properly functioning immune system is the basis for all long-term health goals. Long-term preventative care and health maintenance goals are being targeted more frequently with newer products, where in the past specific symptoms were treated. A large ageing population, with more health stressors on the immune system, has the market poised to launch much needed innovative products. Immune health begins with achieving a healthy lifestyle which includes proper amounts of food, sleep and exercise relevant to a specific individual's needs—although this may not always be easy to determine. In reality, one or more of these things may not be happening at optimum levels, creating conditions for a compromised immune system. This is where the supplement, functional food and beverage markets have tried to fill the gap.

The immune system is extremely complex and requires a variety of nutritional compounds daily to function normally. A few of the most highly recognised are vitamin C, vitamin E and zinc. In many immune products, these are incorporated at higher dosages than typically found in natural



foods to help boost the immune system's effectiveness. These products continue to be a staple in the immune marketplace despite conflicting studies on their effectiveness, as a brief literature search of clinical summaries in this area is not conclusive on the effectiveness of high dose vitamin C for preventing the common cold, especially in cases where vitamin deficiency is not a factor.^{2,3} Most data merely supports the shortening of cold symptoms in some cases.

As product demand changes from the older vitamin and mineral-based products to newer natural ingredients or convenient delivery systems, many consumers are looking at the immune category for innovative products. While there have been some new ingredients introduced to the immune market, many products on the market still rely on the more 'tried and true' ingredients with non-traditional delivery systems like gummies, foods and beverages. Also, ingredients previously marketed for other health indications with immune health as a side benefit are now enjoying a spotlight in the immune health category.



“ **Raw ingredients** include a combination of plant extracts and newer, more science-driven ingredients derived from plants or specific live cultures.

In the dietary supplement market, there are a variety of common extracts or other powdered raw materials that have become staples in many immune formulas. These raw ingredients include a combination of plant extracts and newer, more science-driven ingredients derived from plants or specific live cultures. Echinacea, astragalus, probiotics, methylsulfonylmethane (MSM) and beta-glucan are just a few that continue to appear in the market. As analytical technology has evolved, patented ingredients are showing up more often in immune products. While many recognise the benefits of beta-glucan or probiotics, the new question becomes what form or strain is the most beneficial? As studies are published, it becomes increasingly clear these newer ingredients are effective and, most importantly, safe. Newer immune ingredients will continue to be introduced as more studies demonstrating safety and efficacy are conducted. Most go-to health databases will have at least one or two listings for specifics in immune health.^{4,5} These lists contain many of the traditional herbal products and vitamins but a few are also beginning to recognise the newer beta glucans and the importance of various probiotic strains, too.

Manufacturers are now blending these new ingredients with vitamins and minerals to create unique, synergistic formulas. When approaching formulation in immune health, it is important to consider the target consumer group.



Historically, tablets, capsules or powdered beverage premixes were common; however, consumers today are more interested in functional foods. With the population becoming more aware of what they eat or drink, there is a new openness to trying new textures or flavours which makes it possible to introduce unconventional delivery systems for immune ingredients. Primary consumer concerns are still taste, nutritional content and, most importantly, availability at a reasonable price. This new food exploration trend is demonstrated best by the probiotics example: until relatively recently, probiotics were available as a capsule or in a fortified yogurt. Now they are showing up in beverages and even spreadable dairy-substitutes. The more convenient immune products can become, the more likely it is consumers will purchase them.



On the botanical side, private label manufacturing seems to be heading toward increased product identity and traceability to satisfy consumer demands for transparency in their products. The labels appearing on some Echinacea products are one example. Echinacea raw material ingredients are primarily derived from extracts of the roots, leaves, stem and flowers of three species: *Echinacea purpurea*, *Echinacea angustifolia* and *Echinacea pallida*. The main active compounds found in the extracts are polyphenolic compounds with each species of

Echinacea containing different amounts of specific phenolic actives. The chemical composition also varies based on the starting plant material composition, extraction process, processing methods and storage conditions. When marketing Echinacea products, the gold standard for labelling by major manufacturers is not just the species, but also the plant part used to manufacture the extract. A few finished products have gone further to label total polyphenols and total cichoric acid content, assuring educated consumers there is a consistency in the quality of ingredients.



Apart from these consumer trends, trends in ingredient selection are changing amongst manufacturers and formulators. While price remains a key component, scientific support is becoming the industry norm. This trend goes beyond immune products; focusing on immune health, this is currently demonstrated in probiotics and beta-glucan. It is demonstrated much less in botanical extracts when the final consumer does not know the exact components found in extracts and extract ratios may or may not be included. In probiotics, specific strains are listed, but consumers typically do not make final purchasing decisions based on this and, as far as the specific culture strains are concerned, this choice lies largely with the manufacturers sourcing their ingredients. Occasionally, there will be a highly educated consumer choosing one product over the other based on the strain of probiotic but primary concerns are still taste, nutritional content and, most importantly, price. It is largely the responsibility of the formulators to check scientific studies for efficacy and safety

to ensure their product works; some of the leading suppliers of probiotics have excelled in this area, even going as far as achieving Generally Recognised as Safe (GRAS) status for applications in children's probiotic products.

For beta-glucans, suppliers are producing overwhelming amounts of data on specific structures and modes of action. Historically, beta-glucans can be traced to original immune health ingredients that contained higher levels naturally, including products derived from plants, bacteria, yeast and fungi. Beta-glucans are naturally occurring polysaccharides isolated from natural sources. While sources for these various beta-glucan ingredients vary, the scientific support for immune health is substantial. A review paper of the importance of fungal beta-glucans raises the issue of choice of structurally unique beta-glucan ingredients.⁶ If the benefits of these ingredients are to be optimised, studies demonstrating how different beta-glucans bind to receptors in the immune system are needed for more efficient finished products. This will assist manufacturers in creating more effective products.

Overall, the market for immune products is healthy and ready for growth. As manufacturers make science-based decisions on new formulation launches, changes will occur in what is available to consumers. While probiotics remain a leader in the food arena, other ingredients will continue to be pervasive in all other areas. As consumers become more educated in preventative healthcare and immune health, these products will have to meet a higher standard. Current manufacturing and formulation trends of increased scientific support and traceability will help the supplement and health food market stay ahead of consumer trends. ●

Colleen May is entomologist and public relations manager at Graminex.



1. *Dietary Supplements Support Immune System and Good Health. CRN. January 7, 2015.*
2. *Hemilä H, Chalker E. Vitamin C for preventing and treating the common cold. Cochrane Database of Systematic Reviews 2013, Issue 1.*
3. <https://ods.od.nih.gov/factsheets/VitaminC-HealthProfessional/>. Updated February 11, 2016.
4. *Web MD. https://www.webmd.com/diet/supplement-guide-ginseng#1*
5. *Mayo Clinic. https://www.mayoclinic.org/diseases-conditions/common-cold/expert-answers/echinacea/faq-20058218.*
6. *Chen J, Seviour R. Medicinal importance of fungal beta-(1-->3), (1-->6) -glucans. Mycol Res. 2007. Jun;111(Pt 6):635-52.*

A Life Stage-Specific Approach to Probiotics for Immune Health

Introduction

The immune system's main function is to protect the body from diseases through the recognition and clearance of pathogens (viruses, bacteria), or infected or cancerous cells. The corollary is the recognition of self and environmental antigens (food, airborne substances, etc.) as non-harmful: this is immune-tolerance. In a perfect world, the immune system performs these two roles perfectly: this is homeostasis. But when the immune response is overwhelmed, infections and diseases can occur. On the other hand, poor immune tolerance can be translated into allergic reaction or auto-immune disease. It is well documented the gut harbours the majority of the body's immune cells—the 'gut-associated lymphoid tissue' (GALT). Consequently, the intimate relationship between the immune system and the gut microbiota is well-established. Today, immunity appears—after gut health—to be one of the best documented areas of application for probiotics. Because both the immune system and the digestive microbiota are established after birth, slowly mature, and evolve through life (Fig. 1), it appears a life-stage specific approach to probiotics for immune health is key to formulating effective immune support probiotics solutions.

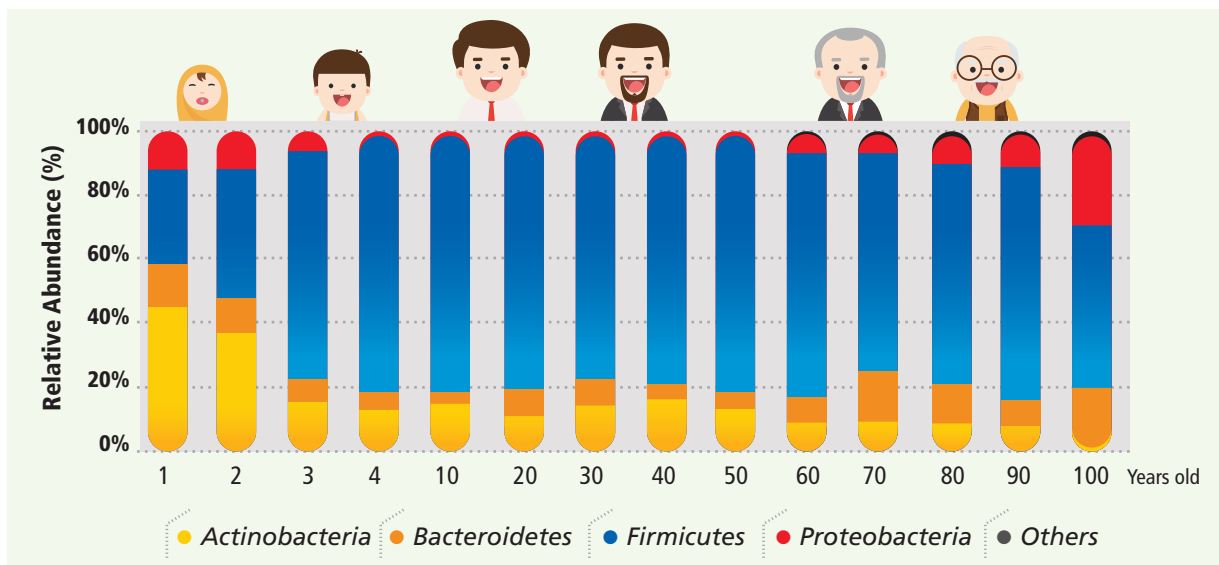


Figure 1: Adapted from Odakami, 2016. Evolution of the digestive microbiota with age (from a large study conducted in 364 healthy Japanese people. In infants, *Actinobacteria*, which include *Bifidobacteria* are predominant and rapidly decrease, while *Firmicutes*, which include *Lactobacilli*, become predominant from 3 years old.

Main mechanisms of action for immunity

Over the past 15 to 20 years, research has shown the effects of probiotics at different levels:

- First, they influence the barrier effect; probiotics help protect the gut surface from potential pathogens and prevent their translocation from the gut lumen by increasing mucin production and improving tight-junction between epithelial cells, or by competing with pathogen binding.

- Certain probiotics have the ability to modulate the non-specific innate immune response.
- Specific probiotics are able to activate specific adaptive immune responses, for a third level of protection.

Addressing children's immunity

During childhood, the immune system is maturing and children are at higher risk of infections or atopic disorders. This is a particular concern for parents in the first years of socialisation (nursery, school), when repeated infections occur, impacting the whole family's quality of life. Young children are prone to colds and may have eight to 12 occurrences every year. Moreover, atopic dermatitis usually starts within the first six months of life and its prevalence is 14 percent among children under 4.

By enhancing the natural gut microbiota, probiotics can help keep pathogens at bay through several actions, such as competitive exclusion. For example, *Lactobacillus helveticus* Rosell®-52 binds to the attachment sites of pathogenic bacteria such as enteropathogenic *Escherichia coli* on intestinal epithelial cells, avoiding pathogen installation and translocation. Probiotics have also been shown to improve intestinal barrier function and enhance epithelium permeability and integrity, or enhance mucus production. Probiotics can influence not only these the first lines of defence for the gut, but also the immune response itself, both innate and acquired (or memory), even at the gene expression level.¹

This scientific data is validated by clinical studies in children. Cazzola et al. published a study involving 135 healthy, school-age children who had suffered from at least three episodes of common infections during the previous winter.² The supplementation with a child-specific synbiotic formula (*Bifidobacterium bifidum* Rosell®-71, *Bifidobacterium infantis* Rosell®-33, *Lactobacillus helveticus* Rosell®-52 and fructo-oligosaccharides [FOS], as ProbioKid®) for three months was shown to decrease the risk of occurrence of common infections in these children by 25 percent vs. placebo, and to limit school absenteeism. Other studies confirm this synbiotic's effects on children's immunity, in particular through positive effect on immunosurveillance, such as increased IgA expression in children with low IgA level.^{3,4} Another study suggests this positive effect could be due to improvement of immune maturity.⁵

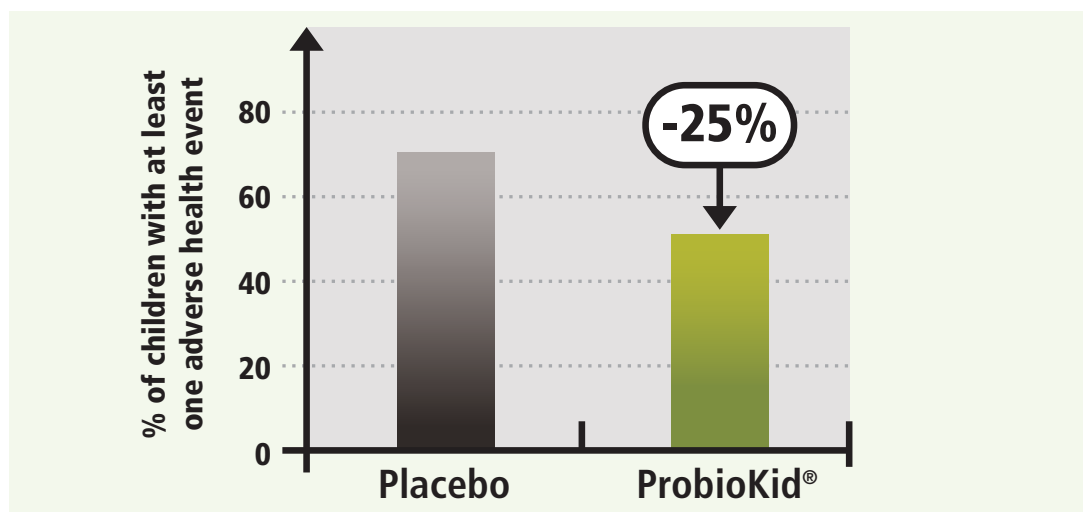


Figure 2: effects of ProbioKid on the percentage of children who developed infection and the number of children who missed at least one day of school due to adverse health event (P<0.05) (Cazzola et al., 2010)

Atopic dermatitis (AD) is frequent in children. The positive effect of certain probiotics on the T-helper (Th)1 and Th2 balance indicates a good potential in alleviating AD symptoms. For example, Chernyshov investigated the effects of *Lactobacillus* Rosell-11 and *Lactobacillus* Rosell-52 combination (Lacidofil®) on the clinical symptoms of AD (represented by Scoring Atopic Dermatitis clinical tool [SCORAD]) and the quality of life for patients and their families. In one report, 36 children up to the age of 4 with AD were given an emollient with Lacidofil®. After one month of treatment, SCORAD improved from 40.82 ± 4.00 to 24.67 ± 3.32 ($P < 0.001$). Additionally, quality of life ratings were significantly greater following treatment ($P < 0.05$).⁶

In a separate study, 58 children with AD up to age 4 were randomised to receive either emollient and Lacidofil® or emollient alone (control group). Children treated with Lacidofil® experienced a greater reduction in clinical symptoms than children treated with emollient alone (Fig. 3). Additionally, Lacidofil® increased IgG4 to cow milk proteins, signifying improved immune tolerance.⁷

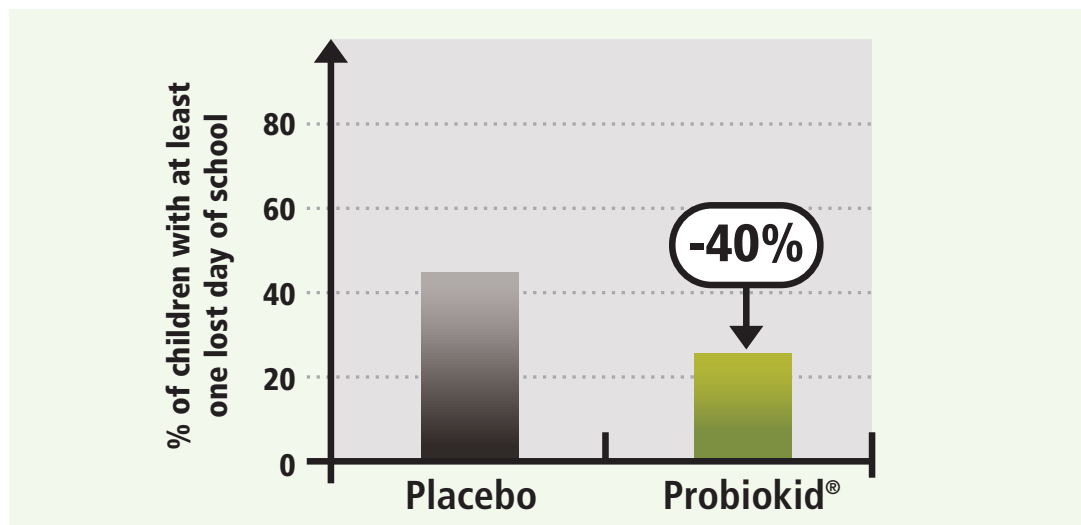


Figure 3: Lacidofil® reduced the percentage of AD patients with marked reduction in SCORAD ($P=0.02$) (Chernyshov, 2009).

From active people to athletes: immunity in adults

In healthy adults, common infections such as cold and flu can be frequent and contagious, particularly during winter or at the seasonal transitions. Adults get an average of two to four colds per year, mostly between September and May.

In addition, chronic stress and high intensity exercise increase the risk of common infections due to an immunosuppressive effect. Thus, populations exposed to high degrees of physical and environmental stress—such as sportsmen and daily-life stressed people—may suffer from an increased incidence of upper respiratory tract illness.

A clinical study investigated the benefits of individual probiotic strains on the occurrence of common infections (cold and flu) in stressed subjects (academically stressed students, a model of acute stress). It was concluded from this unique study, 'daily intake of *Bifidobacterium bifidum* R0071 provides benefits related to cold and flu outcomes during acute psychological stress'.⁸

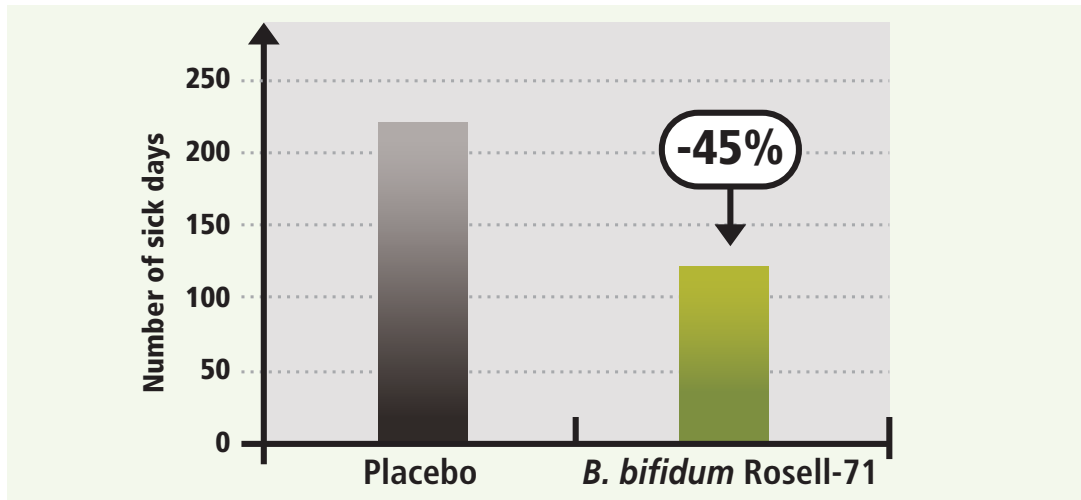


Figure 4: Effect of *B. bifidum* Rosell-71 on the number of sick days in academically stressed students; $p < 0.05$ (Langkamp-Henken et al., 2015).

Another clinical study shows interesting benefits of another probiotic strain (*Lactobacillus helveticus* LAFTI® L10) to support the immune response in stressed adults.⁹ A double-blind, randomised, parallel group, placebo-controlled clinical study was conducted during the winter period to estimate the effects of *L. helveticus* LAFTI® L10 on winter infections such as common cold and flu. Three hundred students, who normally suffer from at least two colds a year, were included in the ten-week study. The study showed a significant reduction of the number of systemic symptoms by 12.2 percent in the probiotic group, moreover the symptoms were less severe with the probiotic. As a result, the probiotic significantly reduced the need for medication: the total number of days with medication intake (mainly analgesics) was reduced by 23 percent.

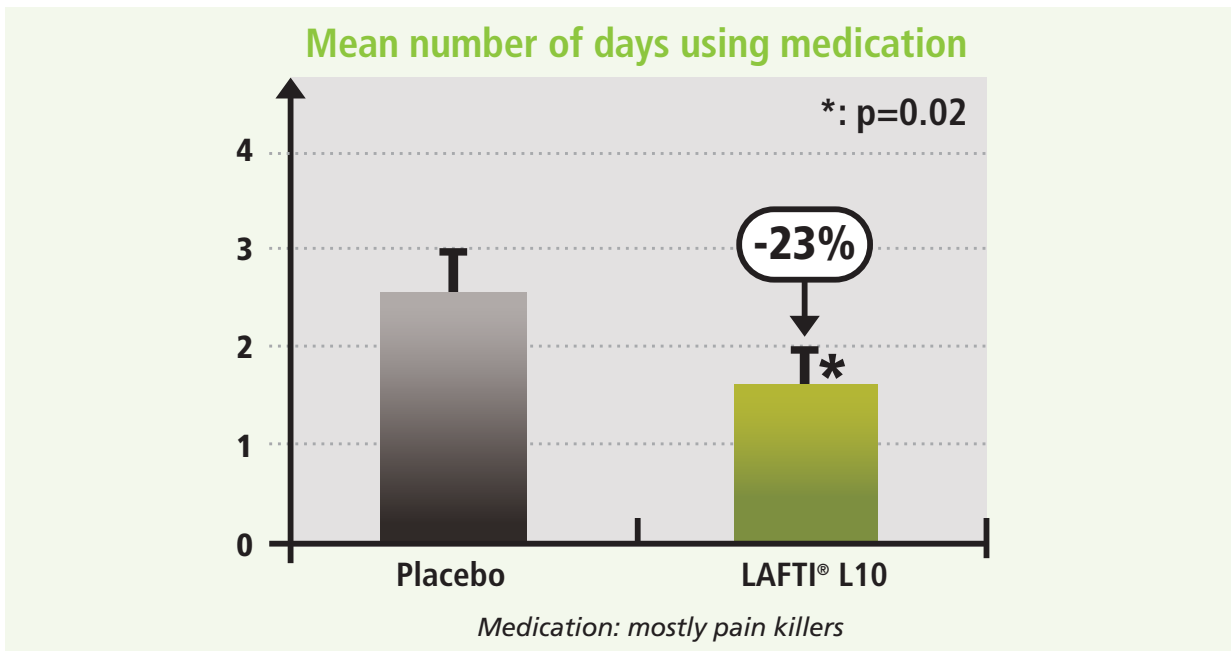


Figure 5: Effect of a ten-week treatment on the need for medication linked to cold and flu (mostly pain killers) (Eccles et al., 2008).

The same strain was also beneficial in training athletes, another sub-population at higher risk of lower immune defenses.¹⁰ A pre-post intervention study was conducted with *L. helveticus* LAFTI® L10 in two groups of well-trained recreational athletes: 18 'healthy' athletes and 9 fatigued athletes, suffering from fatigue, recurrent sore throats, and impaired performance.

The study showed :

Fatigued athletes have an impaired immune response: before the probiotic treatment, the two groups showed a significant difference in levels of interferon- γ (IFN- γ), a cytokine involved in protection against virus infections. Fatigued athletes showed less secretion of IFN- γ from blood CD4+ T cells than healthy controls, which could explain the reactivation of Epstein Barr virus disease in these athletes, responsible for recurrent sore throat.

L. helveticus LAFTI® L10 treatment restored the impaired immune response: after one month of *L. helveticus* LAFTI L10 administration, CD4+ T cells secretion of IFN- γ in fatigued athletes was restored to the levels found in healthy athletes. For the healthy group, IFN- γ level in saliva also increased.

The results of this study are correlated with previous in vivo studies whereby *L. helveticus* LAFTI L10 induced the production of IFN- γ in challenged animals.

Immunity in seniors

Probiotics and the elderly have a historic relationship. Nobel Prize winner Elie Metchnikoff, the 'father of probiotics', discovered the benefits of lactic ferments while searching for the fountain of youth. In his book, *The Prolongation of Life—Optimistic Studies*, published in 1910, he linked bodily degeneration to the presence of 'putrefactive bacteria' in the intestine. By observing the exceptional longevity and good health of Eastern European populations who consumed fermented dairy products daily, he then attributed health benefits to lactic-acid producing bacteria and probiotics were born!

Today, empiric observations have given way to clinical studies and in vitro research, corroborating Metchnikoff's theory certain probiotics can help ageing populations.

The elderly are more susceptible to infectious diseases such as influenza, which can deteriorate into more serious conditions such as pneumonia. This is partly due to immunosenescence: there is a strong body of evidence showing ageing is accompanied by severe alterations in the immune system. Among these changes are alterations in T-cell subpopulation size, cytokine secretion pattern, cell replicative capacity and antibody production. This can result in a poorer response to vaccines and an impaired control of latent viruses.

Another consequence is the profound modification within the cytokine network leading to the development of a low-grade inflammatory status, known as 'inflammaging'. This chronic inflammatory status has been linked to a continuous antigenic load and stress and appears to be the price paid for immunological memory.



The elderly

are more susceptible to infectious diseases such as influenza, which can deteriorate into more serious conditions such as pneumonia.

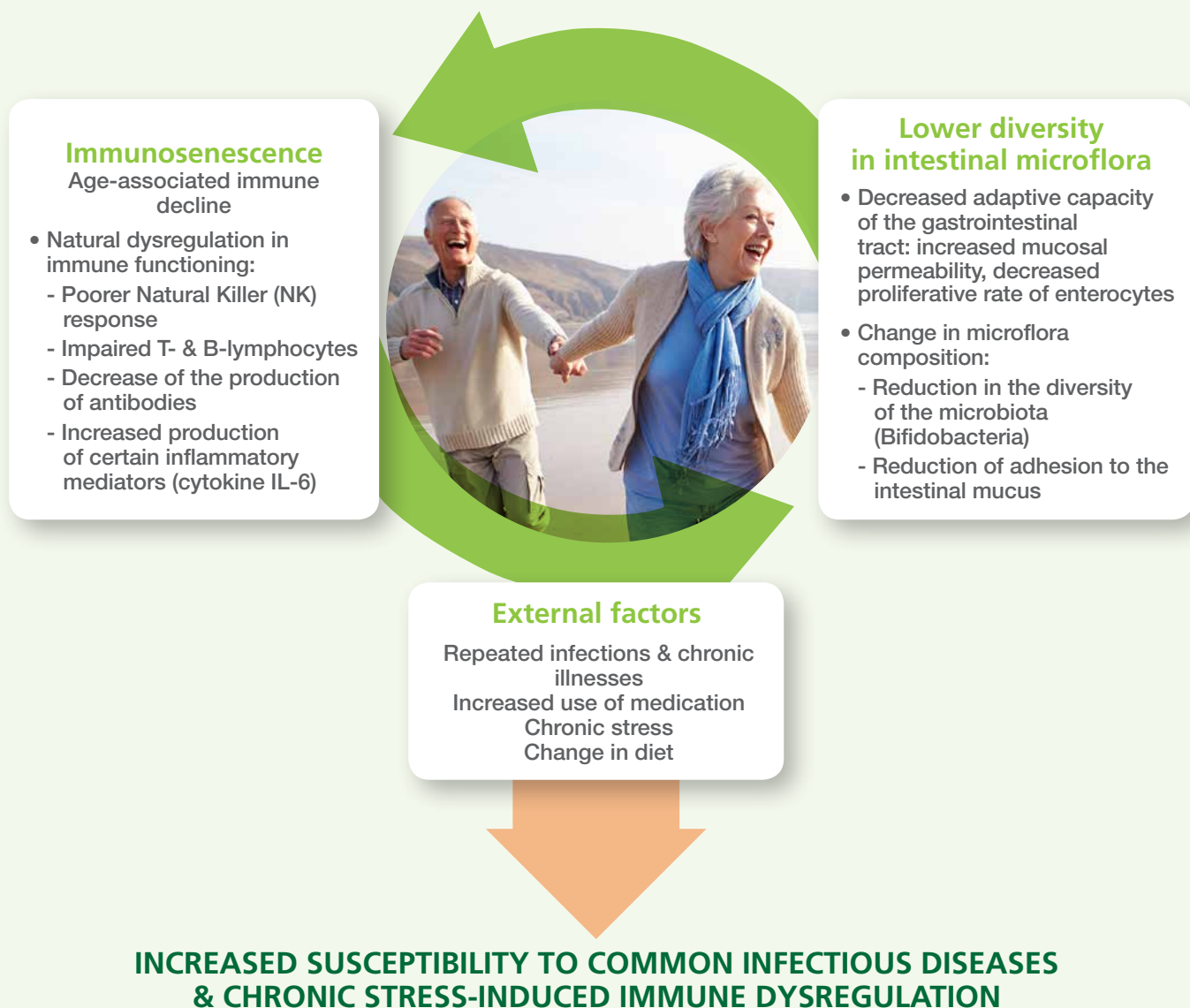


Figure 6: Proposed relationship between immunity and digestive microflora in elderly populations.

The digestive microflora is also affected by ageing; its diversity is reduced. Levels of *Bifidobacteria* decline and species breakdown is altered.¹¹ On the other hand, the proportion of *Clostridia*, *Lactobacilli*, *Streptococci* and *Enterobacteria* increase

It has been advocated modulating the gut microbiota by increasing *Bifidobacteria* level is a good strategy in the elderly. Several studies have shown a positive impact of certain *Bifidobacteria* supplementation on gut microflora balance (increased faecal *Bifidobacteria*).

As seen previously, clinical trials in stressed adults and children indicate specific strains can induce immune-protection in at-risk populations. For example, *L. helveticus* LAFTI® L10 is able to help restore a depressed immune response in athletes, which indicates a good potential in seniors with a lowered immune response. Such probiotic strains have the potential to alleviate the effect of immunosenescence.

The evidence of the benefits of probiotics on immunity is growing strongly, with proven benefits in boosting immune defences and balancing the Th1-Th2 balance. ●

Sylvie Roquefeuil is communications and PR manager at Lallemand Health Solutions.

References

- 1 Mac Pherson et al. *Genome-Wide Immune Modulation of TLR3-Mediated Inflammation in Intestinal Epithelial Cells Differs between Single and Multi-Strain Probiotic Combination*. PLOS ONE January 2017
- 2 Cazzola M et al. *Efficacy of a synbiotic supplementation in the prevention of common winter diseases in children: a randomized, double-blind, placebo-controlled pilot study*. *Ther Adv Respir Dis*. October 2010 vol. 4 no. 5 271-278
- 3 Pantovic. *Serum immunoglobulin levels in children with respiratory infections who used a synbiotic dietary supplement*. *PONS Med J* 2012; 10(1): 7-11
- 4 Chen et al. (2007) *Mucous membrane immunity enhanced by taking Biostime probiotics*. *Chinese Journal of Ecology*, April 2007 Vol 19, No. 2, 137-141.
- 5 Stojkovic et al. *Clinical trial / experimental study (consort compliant): Optimal time period to achieve the effects on synbiotic-controlled wheezing and respiratory infections in young children*. *Srp Arh Celok Lek*. 2016 Jan-Feb; 144(1-2): 38-45
- 6 Chernyshov, P.V. *Integrated treatment of infants, patients with atopic dermatitis*. *Дерматологія [Dermatology]*. 2007; 3: 23-26.
- 7 Chernyshov P.V. *Randomized, placebo-controlled trial on clinical and immunologic effects of probiotic containing Lactobacillus rhamnosus R0011 and L. helveticus R0052 in infants with atopic dermatitis*. *Microbial Ecology in Health and Disease*. 2009; 21: 228–232
- 8 Langkamp-Henken et al. *Bifidobacterium bifidum R0071 results in a greater proportion of healthy days and a lower percentage of academically stressed students reporting a day of cold/flu: a randomised, double-blind, placebo-controlled study*. *Br J Nutr*. 2015 Feb 14; 113(3): 426-34
- 9 Eccles et al. *A study on winter infections in students*. *Common Cold Centre and Healthcare Clinical Trials, Cardiff School of Biosciences, Cardiff University*. 2008
- 10 Clancy et al. *Reversal in fatigued athletes of a defect in interferon γ secretion after administration of Lactobacillus acidophilus*. *Br J Sports Med* 2006; 40: 351–354
- 11 Rondanelli M, et al. *Review on microbiota and effectiveness of probiotics use in older*. *World Journal of Clinical Cases*. 2015; 3: 156-162

**Vitafoods™
Europe**



15-17 May 2018
Palexpo, Geneva, Switzerland

Where the entire
nutraceutical supply
chain does business

**Ingredients &
Raw Materials**



**Branded
Finished
Products**



**Contract
Manufacturing
& Private Label**



**Services &
Equipment**



21,000+

senior buyers from 115 countries



1,100+

exhibiting global suppliers



€1,773,716

average spend per visitor
on nutraceuticals per annum



€528,260

is the average revenue expected
to be generated as a result of exhibiting



vitafoods.eu.com

To book a stand or for more
information call +44 (0)20 7017 6278
julia.gowda@informa.com



Antioxidants

The Immune and Inflammation Connection

by Katie Self

Fighting imposing threats such as free radicals can be managed using antioxidants, which get the body in prime shape to sustain a healthy immune system, whether incorporated through whole foods or supplements. Incorporating antioxidant-rich supplements and functional foods to a balanced diet can help boost the immune system and fight free radicals. An expansive collection of nutritional substances serve as antioxidants: beta-carotene, garlic, vitamin E and zinc are among the ones commonly known to help ensure the immune system is functioning properly. Selenium and polyphenols are other important antioxidants.

Consumer research and awareness

It is paramount for manufacturers and suppliers to reach out to consumers to pass on vital information. In a recent survey, Kyowa Hakko USA found only 16 percent of consumers believe they have a healthy immune system, but 83 percent believed they were able to proactively boost their immune systems.

According to Tom Vierhile, innovation insights director, GlobalData, consumers who are more concerned about germs, viruses and bacteria at home are also much more likely to consume functional health drinks which address immune health concerns: 'Globally, among those consumers stating they are "very concerned" about germs, viruses and bacteria at home, 13 percent consume functional health drinks either daily or almost every other day'. In contrast, only 6 percent of consumers who claim to be 'unconcerned' consume functional health drinks almost daily. Consumer purchasing patterns, then, appear directly linked to the level of concern over germs and immune health. Education on the importance of immune health and how it relates to natural products may be the key to heightened recognition by consumers.

Brands that focus on overall immune health can benefit from partnering with ingredient suppliers that reach out to consumers through social media, ad campaigns and strong public relations. Cashtyn Lovan, a senior marketing associate for Embria, said the company has invested in proprietary consumer research to better position products with EpiCor, an ingredient focused on providing a natural method to boost the immune system. Embria also devotes efforts to social media campaigns and public relations programs. Lovan said Embria practices consumer outreach 'in [its] association with the captain of the U.S. women's soccer team, Christie Rampone, as an EpiCor spokesperson to raise awareness for the EpiCor brand.' Lovan added, 'These efforts have paid off as newly commissioned research shows an 18-percent aided awareness of EpiCor among immune supplement users.'

IN THIS ISSUE

Probiotics for Immune Health **p.9**

Takeaways **p.22**

Table of Contents **p.2**

Similarly, Karen Todd, a registered dietician and senior director of global brand marketing for Kyowa Hakko USA, said the company performs its own consumer-based research annually, specifically on product claims, to ensure that its messaging is still of interest to their target consumers. 'We also have a consumer advertising program and are active on social media networks to help educate and inform consumers,' Todd said.

Antioxidant ingredients for immune health

A recent study showed taking 1,000 mg of Setria® **glutathione** (GSH, from Kyowa Hakko) was effective in increasing natural killer cytotoxicity.¹ The importance, Todd pointed out, is natural killer (NK) cells, affected by cytotoxicity, support the immune system. In the same study, Setria increased blood GSH levels and supported the immune system. According to Todd, GSH levels should be replenished every morning when levels are at their lowest and oxidative risk is high. The study also demonstrated critical benefits of Setria GSH included antioxidant protection, detoxification and fortification of the immune system. GSH acts as the major endogenous intracellular antioxidant, according to the study. The method by which the trial was executed included varying doses: a random six-month double blind placebo-controlled trial of either 250 or 1,000 mg/d dose of GSH taken orally by 54 non-smoking adults. The controlled trial revealed elevated GSH levels after one, three and six months against a baseline at two doses. According to the trial, increases were dose- and time-dependent. In addition, 'natural killer cytotoxicity increased twofold in the high-dose group versus placebo (P<0.05) at three months.'

EpiCor is a whole-food **yeast fermentate** produced from *Saccharomyces cerevisiae*, which strengthens the immune system and increases antioxidant power.² 'Most other immune products, including beta-glucans, are known to simply boost the immune system,' Lovan said. A 2014 study found EpiCor significantly reduced free radical formation under oxidative stress. The study also showed pre-treatment of cells with EpiCor reduced migration toward the inflammatory chemokine LTB4 (also known as chemotaxis), which was also statistically significant over a wide dose range. An earlier study from the same researchers reported a 500-mg dose of EpiCor increased natural killer (NK) cell activation and serum antioxidant levels within two hours.³ Other rapid changes included effects on T lymphocytes and NK cell circulation. The placebo-controlled randomised crossover study design with 12 healthy adults found a reduction in circulating T and natural killer cell numbers two hours post-consumption.

Beta-glucan has demonstrated effects on immune health in relation to colds, the flu, upper respiratory symptoms and immune symptoms. Studies have shown baker's yeast beta-glucan may effectively reduce cold and flu symptoms, as well as improve the psychological well-being of ragweed allergy sufferers.⁴ A 2013 study found a beta-glucan ingredient may help athletes stay healthy after intense exercise.⁵ Using the immune health ingredient Wellmune WGP® (from Biothera), researchers from three American universities reported beta-glucan was associated with a 37-percent reduction in cold and flu symptom days in runners compared to





placebo. An unpublished 2014 study revealed that proprietary beta 1/3, 1/6 glucan from baker's yeast (as Wellmune WGP from Biothera) can help support the immune health of older adults during cold and flu season. In healthy adults aged 50 to 70 years who consumed 250 mg of Wellmune, the beta-glucan ingredient demonstrated a trend toward reducing the number of upper respiratory tract infections (URTI) and statistically significant changes and trends in cytokine levels that are part of the body's response to viral encounters and inflammation.

Coupled with the ability to fight germs and bacteria, **selenium** has been found to protect DNA: as part of the European Food Safety Authority's (EFSA) Panel on Dietetic Products, Nutrition and Allergies, a 2009 study concluded 'a cause and effect relationship has been established between the dietary intake of selenium and protection of DNA, proteins and lipids from oxidative damage, normal function of the immune system, normal thyroid function and normal spermatogenesis.'⁶ Earlier research has shown selenium, especially selenoproteins, are associated with diminished macrophage activity.⁷ Chinese Academy of Sciences, Beijing, researchers confirmed the negative effect low selenium levels can have on innate immunity, showing selenium-deficient animals were not only more susceptible to bacterial infection (*Listeria monocytogenes*), but also suffered a decreased response to the infection.⁸

By supplementing with **French maritime pine bark** in combination with vitamin C and zinc, the duration of common cold symptoms, including runny nose, nasal obstruction, sore throat, sneezing, fever and cough, are lessened.⁹ In a 2013 study, subjects supplementing with Pycnogenol from Horphag Research (100 mg/d) in conjunction with vitamin C (200 mg/d) and zinc (30 mg/d) shortened the duration of cold symptoms to four days, compared to the average of seven days when taking Pycnogenol alone, Pycnogenol plus vitamin C or Pycnogenol plus gluconate zinc.

A double blind, placebo-controlled study on **mushroom mycelia extract** utilized 21 healthy volunteers and showed AHCC (active hexose correlated compound) supplementation for four weeks increased the number of dendritic cells, responsible for detecting and consuming foreign bodies, in addition to activating immunity.¹⁰ A controlled four-week study published in August 2014 demonstrated healthy participants who took AHCC maintained normal NK cell activity and index-scored immune competence, while subjects taking placebos experienced a significant decline in NK cells and immunological vigor.¹¹ A recent study from Michigan State University illustrated that taking Maypro's AHCC mushroom mycelia extract in combination with a flu shot increased anti-body titres to influenza B three weeks post-vaccination, while the vaccine alone failed to produce statistically significant benefits.¹²

Antioxidants

Traditionally used for its anti-inflammatory and antimicrobial properties by Native Americans, **Echinacea** has been a powerful go-to in the realm of herbal remedies. In a 2007 analysis published in *The Lancet Infectious Diseases*, research showed the botanical may reduce risk of catching a common cold by up to 60 percent.¹³ Included in the research, a study on a combination of Echinacea and vitamin C cut the chances of catching a cold by 86 percent, while Echinacea alone reduced a common cold by 65 percent. Meanwhile, a 2003 review from University of Wisconsin noted several immunomodulatory properties in Echinacea, including activation of macrophages, leukocytes and NK cells.¹⁴ In 2010, a randomised trial on the common cold in 719 patients aged 12 to 80 years found only a half-day benefit in illness duration among those taking echinacea.¹⁵

Vitamin E and **zinc** are essential nutrients which beef up immunity in the body by building an antioxidant defence system by shielding lipid membranes. In a study monitoring the effects of vitamin E, 32 healthy men and women over the age of 60 took either a vitamin E supplement or a placebo.¹⁶ After the 30-day study, the majority of those who took vitamin E showed improvements in their immune responses. Meanwhile, research conducted by the Ohio State University found zinc interacts with cells that respond against infection, and it shuts down the immune response that prevents inflammation.¹⁷ Researchers found if a person is deficient in zinc, the body's defence system is amplified inappropriately; they suggested zinc supplementation to help defend the body against infection. **Garlic** has also generated positive research results as another immune health contributor. In 2010, in vitro research on immunomodulatory proteins from raw garlic and various immune cells, including lymphocytes, mast cells and basophils, found the proteins were mitogenic (promoting cell duplication) toward human peripheral blood lymphocytes, murine splenocytes and thymocytes.¹⁸ In addition, a report published in 2011 demonstrated fructans in garlic also contribute to the immunomodulatory properties of AGE.¹⁹ Researchers noted the fructans displayed mitogenic activity and activation of macrophages, including phagocytosis.

Boosting overall immunity in the body can happen through many means: antioxidant supplements, functional and whole foods, and raising consumer awareness are all keys to unlocking the body's full potential. Research continues to demonstrate crucial factors in immune health and the protective role antioxidants play. Researchers, manufacturers and suppliers remain persistent to deliver quality products to consumers, adding yet another step in maintaining optimal immune health. ●

This article was originally published on Natural Products INSIDER, Volume 5, Issue 11: The Immune Health and Inflammation Connection.



References

1. Richie JP Jr et al. 'Randomized controlled trial of oral glutathione supplementation on body stores of glutathione.' *European Journal of Nutrition*. May 2014, Page 1.
2. Jensen GS et al. 'Anti-inflammatory properties of a dried fermentate in vitro and in vivo.' *J Med Food*. 2015 Mar;18(3):378-84. doi: 10.1089/jmf.2013.0158.
3. Jensen GS et al. 'Antioxidant bioavailability and rapid immune-modulating effects after consumption of a single acute dose of a high-metabolite yeast immunogen: results of a placebo-controlled double-blinded crossover pilot study.' *J Med Food*. 2011 Sep;14(9):1002-10. DOI: 10.1089/jmf.2010.0174.
4. Talbott SM et al. 'Baker's yeast beta-glucan supplement reduces upper respiratory symptoms and improves mood state in stressed woman.' *Journal of the American College of Nutrition*. 2012; 31 (4) 295-300.
5. McFarlin B et al. 'Baker's yeast beta glucan supplementation increases salivary IgA and decreases cold/flu symptomatic days after intense exercise.' *J Diet Suppl*. 2013 Sep;10(3):171-83. DOI: 10.3109/19390211.2013.820248.
6. Bresson, Jean-Louis, et al. *EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA); 'Scientific Opinion on the substantiation of health claims related to zinc and function of the immune system.'* (ID 291, 1757) *EFSA Journal*. 2009;7(9):1220.
7. Carlson BA et al. 'Selenoproteins regulate macrophage invasiveness and extracellular matrix-related gene expression.' *BMC Immunol*. 2009 Oct 28;10:57.
8. Wang C et al. 'Selenium deficiency impairs host innate immune response and induces susceptibility to *Listeria monocytogenes* infection.' *BMC Immunol*. 2009 Oct 24;10:55.
9. Belcaro G. 'The Common Cold Winter Study: effects of Pycnogenol on signs, symptoms, complications and costs.' *Otorinolaringologia*. 2013 Sept;63:151-61.
10. Terakawa N et al. 'Immunological Effect of Active Hexose Correlated Compound (AHCC) in Healthy Volunteers: A Double-Blind, Placebo-Controlled Trial.' *Nutrition and Cancer*. 2008;60(5): 643-651.
11. Takanari J et al. 'Effects of Active Hexose Correlated Compound on the Seasonal Variations of Immune Competence in Healthy Subjects.' *Journal of Evidence-Based Complementary & Alternative Medicine*. 2014 Nov; DOI: 10.1177/2156587214555573.
12. Roman B, Beli E, Duriancik D, Gardner E. 'Short-term supplementation with active hexose correlated compound improves the antibody response to influenza B vaccine.' *Nutrition Research Journal*. 2013;12-17.
13. Shah S et al. 'Evaluation of echinacea for the prevention and treatment of the common cold: a meta-analysis.' *The Lancet Infectious Diseases*. July 2007;7(7): 473-80.
14. Barrett B. 'Medicinal properties of Echinacea: a critical review.' *Phytomedicine*. 2003 Jan;10(1):66-86.
15. Clement-Kruzel S et al. 'Immune modulation of macrophage pro-inflammatory response by goldenseal and Astragalus extracts.' *J Med Food*. 2008 Sep;11(3):493-8.
16. Meydani SN et al. 'Vitamin E supplementation enhances cell-mediated immunity in healthy elderly subjects.' *The American Journal of Clinical Nutrition*. 1990 Sept;52 (3): 557-563.
17. Liu MJ et al. 'ZIP8 Regulates Host Defense through Zinc-Mediated Inhibition of NF-kB.' *Cell Reports*. 2013; Online.
18. Clement F et al. 'Identity of the immunomodulatory proteins from garlic (*Allium sativum*) with the major garlic lectins or agglutinins.' *Int Immunopharmacol*. 2010 Mar;10(3):316-24. 14.
19. Chandrashekar PM et al. 'Isolation, structural elucidation and immunomodulatory activity of fructans from aged garlic extract.' *Phytochemistry*. 2011 Feb;72(2-3):255-64.

Takeaways for Your Business

While the nutrition market sees ups and downs across health issues, the category of immune health continues to show strong growth. According to a survey conducted by the Council for Responsible Nutrition, 25 percent of adults take supplements for immune health. In another recent survey by Kyowa Hakko, 83 percent of respondents said they believed they could proactively boost their immune systems. This interest is pushing manufacturers and suppliers of ingredients that support immune function to create safe, efficacious products.

Understanding consumers' interest in the immune health category goes with the standard medical advice that having a properly functioning immune system is the basis for all long-term health goals. Long-term preventative care and health maintenance goals are being targeted more frequently with newer products, where in the past specific symptoms were treated. A large ageing population, with more health stressors on the immune system, has the market poised to launch much needed innovative products.

The immune system's main function is to protect the body from diseases through the recognition and clearance of pathogens or abnormal cells. The corollary is the recognition of self and environmental antigens as non-harmful. In a perfect world, the immune system performs these two roles perfectly: this is homeostasis. But when the immune response is overwhelmed, infections and disease can occur.

It is well documented the gut harbours the majority of the body's immune cells—the 'gut-associated lymphoid tissue' (GALT). Consequently, the intimate relationship between the immune system and the gut microbiota is well-established. Today, immunity appears—after gut health—to be one of the best documented areas of application for probiotics. Because both the immune system and the digestive microbiota are established after birth, slowly mature, and evolve through life, it appears a life-stage specific approach to probiotics for immune health is key to formulating effective immune support probiotics solutions.

The immune system is extremely complex and requires a variety of nutritional compounds daily to function normally. Incorporating antioxidant-rich supplements and functional foods to a balanced diet can help boost the immune system and fight free radicals. An expansive collection of nutritional substances serve as antioxidants; beta-carotene, garlic, vitamin E and zinc are among the ones commonly known to help ensure the immune system is functioning properly. Selenium and polyphenols are other important antioxidants. Specific products addressing cold and flu immune health conditions are gaining consumer popularity, such as cranberry extracts, garlic, superfruits and B vitamins. Beta-glucan has demonstrated effects on immune health in relation to colds, the flu, upper respiratory symptoms and immune symptoms.

Boosting overall immunity in the body can happen through many means: antioxidant supplements, functional and whole foods, and raising consumer awareness are all keys to unlocking the body's full potential. Overall, the market for immune products is healthy and ready for growth. While probiotics remain a leader in the food arena, other ingredients will continue to be pervasive in all other areas. ●



Vitafoods is the leading brand in Europe and Asia connecting companies across the food, beverage, supplement and personal care markets with ingredient suppliers, contract manufacturers and service providers. Vitafoods Insights (vitafoodsinsights.com) is a premium content destination that delivers the best content from Vitafoods to a global audience.

Jon Benninger
Vice President, Health & Nutrition
jon.benninger@informa.com

Heather Granato
Vice President, Content
heather.granato@informa.com

Danielle Dunlap
Vice President, Marketing Services
danielle.dunlap@informa.com

Andrew Rosseau
Art Director

Jenn Moreira
Senior Marketing Manager

Informa Exhibitions LLC
2020 N. Central Ave, Suite 400
Phoenix, AZ 85004
United States

Phone: +1 480 990 1101
www.naturalproductsinsider.com

Chris Lee
Managing Director, GHNN Europe
chris.lee@informa.com

Julia Wocka-Gowda
Head of Sales
julia.gowda@informa.com

Maria Sidiropoulou
Sponsorship Programme Executive
maria.sidiropoulou@informa.com

Colin Williams
Senior Marketing Manager
colin.williams@informa.com

Jade Mitchell-Ross
Associate Editor
jade.mitchellross@informa.com

Informa Exhibitions
2nd Floor
5 Howick Place
London SW1P 1WG
United Kingdom

Phone: +44 (0) 20 3777 3616
www.vitafoods.eu.com



GLOBAL HEALTH & NUTRITION NETWORK™
expertise | connections | business results

Informa Exhibitions' Global Health & Nutrition Network is one of the world's leading knowledge providers. We create and deliver highly specialised information through events, digital media and publishing to provide business, learning and networking opportunities. Informa's Global Health & Nutrition Network has an unrivalled offering within the health and nutrition marketplace for individuals, businesses and organisations around the globe.

