



*Maintaining healthy immune systems has moved decidedly toward intestinal fortitude, with gut-health ingredients such as probiotics and prebiotics leading the way. The other avenue suppliers are pursuing is through unique branded ingredients. **Todd Runestad** investigates the changing immune-health landscape*

The traditional nutritional-supplements method to address immune health has been via a vitamin, a mineral and herbs — namely, vitamin C, zinc, echinacea and garlic. Vitamin C sales have been steady since 2002, rising about 2.5 per cent in 2007 to about \$850 million in the US. But zinc sales have decreased from their 2000 high of \$85 million to about \$72 million last year, a 15 per cent decline. Echinacea's fortunes are off by about 25 per cent from their high of more than \$200 million in 1999 sales. The demand for garlic has steadily declined since 1997 — partly because of its renowned efficacy for cardiovascular conditions, which has been usurped by newer and more novel ingredients.<sup>1</sup>

Today's immune market has moved on, and is finding good growth in two separate and distinct areas: gut health and unique branded ingredients. Gut-health ingredients are predicated on the function of the digestive system, which extracts and absorbs nutrients from foods, and also attacks harmful organisms that may be present in foods. Branded ingredients address the gamut of the highly complex innate and adaptive immune response, from boosting natural killer (NK) cell counts to enhancing cytokine production.

## Gut response

It is estimated that three quarters of the cells necessary for the immune system to function effectively are connected to the gastrointestinal tract. In addition, without proper digestive function, basic metabolic processes break down, leading to various disease states.

Probiotics — intestinal microbes — are a key factor in the development of the post-natal immune system and in acquired immune response and inflammation. The intestinal flora in the large intestine plays an important role in protecting against pathogens. The beneficial bacteria line the luminal wall of the intestine and guard against infection. These probiotics produce the natural antibiotic-like substance acidophilin, and inhibit or reduce the proliferation and adhesion to intestinal cells of undesirable bacteria, known as the barrier effect.<sup>2</sup>

One 2008 study found the probiotic species *Bifidobacterium infantis* normalised gut permeability and improved disease in an animal model of colitis.<sup>3</sup> In addition, microflora modulate the immune system, thereby reinforcing the body's natural defence.<sup>4</sup>

Much company-sponsored research takes specific probiotic strains and works on "delivering efficacious doses to the appropriate gastrointestinal tract location," according to Bob Berman, senior marketing manager at DSM, which supplies the Lafti range of probiotics.

While the conventional use of probiotics is aimed at modulating gastrointestinal health by increasing natural resistance to infectious diseases, other potential applications include menopause, cholesterol and hypertension with various specific strains.<sup>5</sup>

On the immunity front, though, a 2008 randomised, double-blind, placebo-controlled study of 77 HIV-infected children (ages 2-12 years) supplemented one group with a probiotic formula containing *Bifidobacterium bifidum* and *Streptococcus thermophilus* (1010 CFUs) for two months. The probiotics group experienced increased CD4 cell counts and reduced liquid-stool episodes, which researchers concluded was positive "immunostimulatory properties" of probiotics.<sup>6</sup> CD4 cells are T-helper lymphocytes with CD4 cell-surface markers, and are used to assess immune status and susceptibility to opportunistic infections.

A 2008 five-month human study with the *L. casei* Shirota strain showed it modulates the immune response to grass pollen, and helps those with hay fever. Hay fever is an allergic reaction to pollen spores whereby

the immune system is confused by the spores, making white blood cells produce cytokines to oppose them. The probiotics reduced production of the cytokines and "significantly reduced the production of molecules associated with allergy," according to the study authors.<sup>7</sup> The probiotic came in the form of Yakult drinks, a popular consumer beverage in Japan.

A recent study involving more than 500 one- to three-year-old children indicated that a year's consumption of Howaru Bifido (*B. lactis* HN019) and Howaru Rhamnosus (*L. rhamnosus* HN001), combined with a prebiotic, reduced the number of days of severe illness or fever and the incidence of ear infections. Three other trials using Howaru Bifido and Howaru Rhamnosus, supplied by Danisco showed enhanced NK cell activity as well as enhanced phagocytic activity of peripheral blood mononucleocytes.<sup>8,9,10</sup>

Prebiotic fibres — primarily inulin, fructo-oligosaccharides (FOS), and galacto-oligosaccharides (GOS) with resistant starch as an emerging prebiotic option — are benefiting from research showing a true synergistic effect when combined with probiotics.<sup>11</sup> This is a vital point that should interest all product developers. Robert Hutkins, PhD, a researcher and renowned probiotics expert at the University of Nebraska, asserts that while research with *E. coli* finds it attaches to FOS instead of the receptors lining the intestinal-tract lining, GOS is the better anti-adhesive prebiotic.

Still, the burning question among researchers is which prebiotic matches up best with probiotic strains to give the best health benefit. Answers to this question should drive commercialisation of the most potent consumer product. It is now no longer just a question of providing sufficient numbers of viable bacteria in a product; industry must also provide proof of efficacy for each strain.<sup>12</sup>

The increasing knowledge of the metabolism of prebiotics by probiotics is allowing researchers and suppliers to consider specifically targeting such dietary intervention tools at specific population groups, and specific disease states beyond mere immunity.<sup>13</sup>

Enzyme supplements: These can increase the absorption and usage of nutrients, decrease stomach discomfort, and lead to a stronger immune system. Enzyme supplements typically consist of lipase, protease and amylase. Lipase breaks down fats found in butter, meat and cheese. Protease assists in the digestion of proteins found in meats and nuts. Because proteins are a key part of food allergies, proteases should aid in that part of immune function. And amylase breaks down the carbohydrates, sugars and starches present in potatoes and other vegetables, fruits, and snack foods.

Of the three categories of enzymes, proteases are vital to the immune system because most types of illness are composed of or enveloped by proteins. Protease enzymes can act upon the protein coating of viruses or any protein that is harmful to the body or does not belong, with one study showing that a mixture of papain and pancreatin was more effective than either alone.<sup>14</sup>

Proteases act as raw material from which the lymph system and bone marrow can manufacture additional white blood cells.<sup>15</sup> Finally, proteases can break down undigested food proteins and toxins in the blood, thus freeing up the immune system from this task.<sup>16</sup>

Digestive enzymes can help with digestive problems, but because they help strengthen your body's immune system, their uses are much broader than just digestion-related illnesses and discomforts. There is a connection between the strength of the body's immune system and its enzyme level — the greater the amount of enzymes, the stronger the immune system will be. Digestive enzymes have been shown to help with wound healing, tissue repair, food allergies and other applications.<sup>17,18,19</sup>

## Branded leaders

AHCC: Active Hexose Correlated Compound is a mushroom extract supplied by Quality of Life Labs. It is a mixture of polysaccharides, amino acids, lipids and minerals derived from cocultured mycelia of several species of Basidiomycete mushrooms. AHCC has been implicated to modulate immune functions and plays a protective role against infection. In a 2006 animal study, it was shown to increase NK cells, killer T-cells and macrophages — all immune-enhancing lymphocytes that regulate both innate and adaptive immune responses.<sup>20</sup> Natural killer cells are the white blood cells of the immune system that are critical in host defence and immune regulation. NK cells are the first line of cellular defence against invading micro-

organisms, bacteria, virusus and other pathogens. They carry cytotoxic granules that oppose invading cells, and play significant roles in viral infections, auto-immunity and adaptive immunity.

T-cells are white blood cells responsible for 'cell-mediated immunity' — the integrated response required for the successful defence of one's health. Macrophages produce cytokines, start the process of antibody production and, through phagocytosis, directly destroy invaders.

In a 2008 double-blind, placebo-controlled, randomised human clinical trial in Japan, the 10 subjects taking 3g/day AHCC for four weeks experienced improvements in some immunity markers — specifically elevated circulating dendritic cells and clusters of differentiation and allogeneic mixed-leukocyte reaction — while no change was observed in NK cell activity and the proliferative response of T lymphocytes toward mitogen.<sup>21</sup>

In a December 2007 study to assess AHCC's safety and tolerability, 26 human subjects were given 9g AHCC/day for 14 days in a liquid format. The dosage well exceeds the normal dose, and it was well tolerated by 85 per cent of subjects, with transient adverse effects of nausea, diarrhoea and bloating.<sup>22</sup>

Of note, a 2007 study in rats found AHCC to possess both anti-inflammatory as well as prebiotic properties. Rats receiving AHCC showed greater colonic bifidobacteria counts and lower incidence of clostridia bacteria.<sup>23</sup> Other published studies in the past two years indicate efficacy in animal models in enhancing resistance to infection after surgery, increasing innate immune response to primary influenza infection, and even enhanced immunity while in outer space.<sup>24,25,26</sup>

In all, AHCC has been the subject of more than 80 clinical trials. It is said that more than 700 hospitals and medical clinics in Japan recommend AHCC as part of an immune-maintenance regimen. It received the NutrAward in 2002 for best new product of the year at the Nutracon conference. The recognition was based on the product's scientific merit, efficacy, safety, innovation, market potential and ability to advance the industry. As a patented ingredient, AHCC can be exclusively licensed to select manufacturers.

Maitake D-Fraction: There actually are thousands of known mushroom varieties, and several have been studied for their ability to enhance the human immune system and fight infections. Some of the more well-known varieties include reishi (*Ganoderma lucidum*), shiitake (*Lentinus edodes*), cordyceps (*Cordyceps sinensis*), and maitake (*Grifola frondosa*).

Maitake is also a premier culinary mushroom. The active proteoglycan in maitake, called the D-fraction, is a unique beta-glucan conjugated with protein. Beta-glucans are naturally occurring polysaccharides that enhance macrophages and NK cell function. The induction of cellular responses by mushrooms and other beta-glucans is likely to involve their specific interaction with several cell-surface receptors.<sup>27</sup>

Much research with D-fraction involves antitumour effects, specifically its ability to inhibit cancer cell growth.<sup>28</sup> Through animal models of cancer, it has been discovered that D-fraction also reduces immunosuppression in tumour-bearing mice. It appears to do this by activating T-cells, macrophages and NK cells.<sup>29,30</sup> NK cells are directly cytotoxic for tumour cells, as well as play a primary role in regulating immune response. Even 20 days after D-fraction ended, NK cells were being activated at an elevated rate. Researchers also found D-fraction increased macrophage-derived interleukin-12, which activates NK cells.<sup>31</sup>

As well as its anticarcinogenic potential, maitake is being investigated as an adjunct to HIV therapy. (It may also provide some benefit in treating hyperlipidaemia, hypertension, hepatitis and diabetes.)<sup>32,33</sup> EpiCor: The story of the discovery of this unique immune-boosting ingredient is a great one. An administrative actuary at the Diamond V plant, which manufactured animal-nutrition ingredients, noticed that those employees who worked directly with a unique brewer's/baker's yeast had far fewer sick days and fewer health-insurance claims.

The scientists stepped in and discovered that those healthier employees had higher NK cell activity and higher antioxidant levels. The ingredient is a dried, complex fermentation product derived from *Saccharomyces cerevisiae*, which came to be known as EpiCor. It also has been found to activate B cells, which support antibody production specific to an invading pathogen. It also acts as an anti-inflammatory.

Two 2008 published human clinical studies vouch for EpiCor's anecdotes. In one, on markers of immune

health, EpiCor supported the health of red blood cells and mucosal immune protection.<sup>34</sup>

The problem with many nutritional studies is that they look at markers and not bottom-line consumer benefit. So what if taking a supplement enhanced cellular markers of immunity? Did a person get sick less often?

With EpiCor, the answer is yes. A 2008 double-blind, placebo-controlled, randomised clinical trial with 116 humans gave half 500mg/day EpiCor. Participants receiving EpiCor had significantly fewer cold and flu symptoms and significantly shorter duration of symptoms as compared to those taking placebo. Cold and flu symptoms were 21 per cent less likely to occur overall, and observable symptom duration was reduced by 14 per cent, with 32 per cent fewer annual sick days.<sup>35</sup>

Cold-fX: CV Technologies, a Canadian company, has developed a unique product that ranks as the top-selling cold and flu remedy in Canada, according to ACNielsen's rating for the 52 weeks ending July 5, 2008. A proprietary extract of the roots of North American ginseng (*Panax quinquefolium*), which is rich in polysaccharides, Cold-fX is the subject of five published human clinicals since 2004.

In one, 42 people between the ages of 18 and 65 with more than two respiratory infections in the previous year were enrolled. After taking Cold-fX 200mg twice daily for four months, the supplementing group had increased proportion of T-helper and NK cells and decreased IgA levels in plasma compared to placebo.<sup>36</sup>

Cold-fX also addresses that same issue of markers vs real-world results. In a double-blind, placebo-controlled, randomised human clinical trial of 43 community-dwelling adults older than 65, there was no difference between groups for the first two months. But for the last two months of the study — November and December — the treatment group experienced 32 per cent fewer incidences of acute respiratory illness compared to placebo. Plus, the duration of symptoms during this time was significantly shorter — 5.6 days vs 12.6 days in the placebo group.<sup>37</sup>

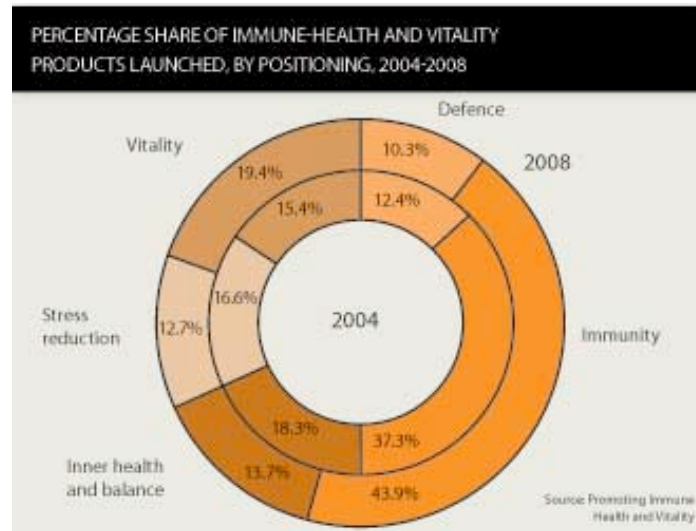
Two larger studies — on 323 and 198 humans, respectively — found similar results.<sup>38,39</sup> The larger of the two was included in the "National Institutes of Health Office of Dietary Supplements Annual Bibliography of Significant Advances in Dietary Supplements Research for 2005."

Research continues on Cold-fX. One is a Canadian multi-centre study among 720 community-dwelling seniors. Two others aim at delineating the product's precise molecular mechanism of action.

Wellmune WGP — More than a dozen published studies have assessed the safety and efficacy of this yeast-derived beta-glucan ingredient from Biothera. It, too, was the winner of the NutrAward competition at Nutracon, for best new product of 2005. It also received the 2007 IFT Food Expo Innovation Award.

It has been shown to activate innate immune cells to move faster to the site of a challenge and more quickly recognize and destroy foreign intruders. In one study, it increased phagocytic capacity — the ability of the innate immune cells to eat and destroy foreign intruders — from 64 per cent to 83 per cent, and increased the number of highly phagocytic cells from 37 per cent to 50 per cent.<sup>40</sup> In another study, it elevated NK cell and T-cell counts over placebo participants from 9.8 per cent to 12.5 per cent, as a percentage of all lymphocytes.<sup>41</sup> Another study found it enhanced the ability of neutrophils to more rapidly respond to an infection site.<sup>42</sup>

Finally, a human study presented at the 2008 American College of Sports Medicine annual meeting showed that wildland firefighters who took the supplement had 23 per cent fewer upper respiratory tract infections compared to a placebo group.<sup>43</sup> An animal study found it to be well tolerated.<sup>44</sup>



...aking a supplement enhanced  
immunity? The question  
...id a person get sick less

"Much of the growth in immunity positioning product development is attributable to the buoyant area of soft drinks, increasing share from 32 per cent of immunity product launches in 2004 to 40 per cent in 2008. Growth in the soft-drinks category has co-incided with share falling back for other key categories such as dairy products and hot beverages. Dairy share declined from 24 per cent to 22 per cent of immunity launches over the review period, while hot beverages' share fell from 14 per cent to just 9 per cent in 2008. . .".

Source: *Promoting Immune Health and Vitality*

NBJ: bright spots in botanicals

It's too early to say which alternative immune-enhancing products might benefit if echinacea leaves a vacuum. But in general immunity remains an area of keen consumer interest. This has likely contributed to fast growth reported for oregano oil, a category that 10-year-old North American Herb & Spice (NAHS) has helped define with its Oreganol and Oregacyn brands. Oregano oil is promoted as an immune stimulator and germ and virus killer, in addition to offering antioxidant megawattage.

"Our company has doubled in the last five years, and sales are up by about 50 per cent," said Sales Manager Stuart Tomc. NAHS is vertically integrated, making branded and private label blended oregano oil from wildcrafted oregano grown on its own land in Turkey.

Although its raw materials are currently only used in-house, NAHS is open to the possibility of supplier sales, said Tomc. Most oregano oil sold in the US comes from Mexico and sells for about \$100-200 per kilo for bulk oil compared to a significantly higher price for NAHS's oil if it were sold as a raw ingredient, according to Tomc. Price is reflective of efficacy and safety, he contended, describing the ease with which oregano oil can be extended with cheaper substances that can crystallize in the liver. "Even unadulterated oil could be dangerous if it has naturally elevated thymol levels," claimed Tomc, who expressed concern that if people don't get the results they hear about, they might abandon the category. Several in vitro and in vivo studies have been conducted on NAHS product, and human trials are underway, said Tomc.

Other ingredients are also swimming against the ebb tide of botanicals sales. Sabinsa Corp. markets Curcumin C3 Complex, for which it has US and international patents on the bioprotectant action of this composition of curcuminoids. "There has been increased dialogue with reference to this product in recent months," said Lakshmi Prakash, director of technical services. "At Sabinsa, the product has always featured in the top five in sales and remains one of our most significant products."

Known for its antioxidant and anti-inflammatory properties, growing interest in turmeric and curcuminoids may be attributed to several factors, not least being an expanding body of science on their health benefits. "Antioxidant, anti-inflammatory, antimicrobial and immune system-supporting roles of curcuminoids are well documented in scientific literature" in in vitro, preclinical and clinical studies, said Prakash.

With the exception of alpha-tocopherol, antioxidants in general have been in the ascendancy. Essentially Pure reported healthy growth of alpha lipoic acid (ALA) in the high 20 per cent range, driven by consumer awareness of antioxidant benefits. In the first quarter 2006, the company plans to launch a supplement blend for diabetes care that will include ALA.

*Excerpted from NBJ's Raw Materials & Ingredient Supply Report 2008, a 448-page compendium of market analysis and top players in the business of supplying raw materials and value-added ingredients to manufacturers in the nutrition industry. For the full report, go to [www.nutritionbusinessjournal.com](http://www.nutritionbusinessjournal.com)*

## Functional Ingredients Q&A

### Case study: Gourmetceuticals — science you can eat

**Fi:** Gourmetceuticals ingredients specifically target foods. The rap on hypernutritious foods is that consumers might have to trade taste for nutrition. Gourmetceuticals, by its very name, is taking aim at that notion. Can it work?

**GL:** Absolutely. While some ingredients may present challenges with taste, both of our ingredients have no taste in final food and beverage products. We have incorporated both ingredients into candies, baked goods and other final products to test for taste.

Consumers cannot be asked to compromise taste for health. When we incorporate our ingredients into an end product, our goal is to have a tasty product that inspires consumer loyalty.

In fact, we are currently running a 'Taste-Free Test' for two granola flavours that incorporate our antioxidant, PPL-240, and our immune booster, GLPH-1. Anyone can go to our website, <http://www.gourmetceuticals.com/TasteFreeTest.html>, to order a free sample of each of the granola products. We'd like to hear what they think.

**Fi:** GLPH-1 is a polysaccharide extract from botanical yeast that binds to specific receptors that activate the immune system.

**GL:** A list of research can be found on our website at the following link: <http://www.gourmetceuticals.com/science.html>.

**Fi:** Are your plans to be vertically integrated, or to sell the ingredients to food companies for specific applications? **GL:** Gourmetceuticals has a two-pronged business model to co-develop end foods that incorporate our ingredients, and to out-license the ingredients to certain food and beverage manufacturers. We are also open to in-licensing new ingredients to add to our portfolio.

**Fi:** Are your ingredients more suited for foods applications than other functional ingredients? That is, did you specifically choose them with taste and texture in mind?

**GL:** Gourmetceuticals did not seek out its ingredients; the company was established as a spin-off of Industrial Farmaceutica Cantabria in Madrid, which has successfully marketed these ingredients as supplements in Europe, and has researched them for more than 20 years.

Our goal is to expand upon this success into the US by utilising the ingredients in foods and beverages. People have difficulty remembering to take a vitamin, much less a supplement, so our goal is to co-develop tasty food and beverage products with our ingredients to obtain consumer loyalty.

## Select suppliers: immune function through innovative ingredients

### AHD International

Kurinol 80% beta-glucan helps protect key cell components from damage by neutralizing free radicals. [www.ahdintl.com](http://www.ahdintl.com)

### BENEO-Orafti

Orafti inulin and oligofructose are prebiotic fibres that work well in food systems; inulin has the same mouthfeel as fat and oligofructose is a natural sugar replacer.

[www.orafti.com](http://www.orafti.com)

### **BI Nutraceuticals**

Full-service supplier of vitamins, botanicals, speciality ingredients and customized blends, from vitamin C to echinacea to high-ORAC ingredients such as RoseOx and Rossentia.

[www.binutraceuticals.com](http://www.binutraceuticals.com)

### **BioCell Technology**

i-Sabi is a high-antioxidant wasabi japonica with immunomodulatory effects including activation of NK cells, and acts with Interleukin-2 to activate these NK cells even more in vitro.

[www.biocelltechnology.com](http://www.biocelltechnology.com)

### **BioNeutra**

Vitasugar is a natural oligosaccharide that acts as a prebiotic and low-calorie sweetener in a variety of foods and beverages, including baked goods.

[www.bioneutra.ca](http://www.bioneutra.ca)

### **Biothera**

Wellmune WGP activates key human immune cells to more quickly recognise and kill foreign challenges. It is GRAS, GMO-free, kosher and nonallergenic, and available as a soluble and insoluble powder for foods and beverages, including clear liquids.

[www.biotherapharma.com](http://www.biotherapharma.com)

### **Cyvex Nutrition**

VitaTropic is a high-ORAC tropical extract of noni, açai, mangosteen and pomegranate, suitable for immune support as well as cardio-support formulas.

[www.cyvex.com](http://www.cyvex.com)

### **Danisco**

Howaru range is a series of target-specific probiotic strains suitable for milks in North America, and in dairy, foods and supps around the world. Litesse polydextrose is a prebiotic fibre, reduced-calorie sweetener, that improves texture.

[www.danisco.com](http://www.danisco.com)

### **Draco Herbs**

More than 500 Full Spectrum standardised herbal extracts, including garlic, echinacea, mushrooms and more.

[www.dracoherbs.com](http://www.dracoherbs.com)

### **DSM**

Lafti probiotic range survives high fermentation temperatures and cold storage (low pH) of yoghurt and related drinks without compromising the organoleptic properties of the products.

[www.dsm.com](http://www.dsm.com)

### **Ecuadorian Rainforest**

Full-line supplier of herbs, vegetables, spices, fruits and marine products, has three species of mushrooms: maitake, reishi and shiitake.

[www.intotherainforest.com](http://www.intotherainforest.com)

### **Embria**

EpiCor is a dried, complex fermentation product derived from a proprietary process consisting of *Saccharomyces cerevisiae* and the medium on which it is grown. It increases salivary IgA (a first line of defence) and increases NK cell activity.

[www.embriahealth.com](http://www.embriahealth.com)

**Gourmetceuticals**

GLPH-1 Immune Booster is a polysaccharide extract derived from the cell wall of the botanical yeast *Candidus utilis*, which stimulates white blood cells.

[www.gourmetceuticals.com](http://www.gourmetceuticals.com)

**Institut Rosell**

Probiocap is an enteric-coating technology that protects probiotics against stomach acidity, leading to 100 per cent protection and delivery. ProbiKid is a combination of three strains selected to modulate each level of gut immune defences.

[www.institut-rosell.com](http://www.institut-rosell.com)

**InterHealth Nutraceuticals**

L-OptiZinc is a unique, patented form of biologically active L-methionine-bound zinc, an essential trace mineral required for proper immune function and more.

[www.interhealthusa.com](http://www.interhealthusa.com)

**Lonza**

FiberAid is a premium soluble prebiotic. See "Formulations," page 30, for more.

[www.lonza.com](http://www.lonza.com)

**Maitake**

Grifron Maitake D-Fraction is a combination of whole maitake mushroom powder and D-fraction, a unique beta-glucan conjugated with protein.

[www.maitake.com](http://www.maitake.com)

**Moringa**

*B longum* BB536 has attained GRAS status, and is formulated to withstand digestive stresses.

[www.morinu.com/bb536/home.html](http://www.morinu.com/bb536/home.html)

**National Enzyme Company**

BioCore line is a comprehensive digestive-enzyme formula, the foundation for every digestive-enzyme solution.

[www.nationalezyme.com](http://www.nationalezyme.com)

**Nebraska Cultures**

*Lactibacillus acidophilus* strain DDS-1 shows superior growth, stability and nutritional viability; aids in the production and/or augmentation of immune bodies.

[www.nebraskacultures.com](http://www.nebraskacultures.com)

**PL Thomas**

GanedenBC30 features a strain of *Bacillus coagulans* GBI-30, 6086, of which 78 per cent survives to colonise the gut. This GRAS, kosher ingredient is shelf stable; survives manufacturing process. GliSODin is superoxide dismutase, an antioxidant.

[www.plthomas.com](http://www.plthomas.com)[www.glisodin.com](http://www.glisodin.com)

**Quality of Life Labs**

This mushroom subsidiary of Maypro Industries includes in its portfolio AHCC (active hexose correlated compound) ImmunoKinoko and ImmunoComplex.

[www.Q-O-L.com](http://www.Q-O-L.com)

**Roquette**

Nutriose is a soluble prebiotic fibre that helps reduce fat and sugar content in dairy products, with no loss of taste or texture.

[www.nutriose.com](http://www.nutriose.com)

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