

IMMUNutrin™

ImmuNutrin™ – The Ultimate Immune Support Immuceutical

Optimal health in today's fast-paced world requires a strong immune system to ward off ever-present pathogens that are continually trying to establish themselves in the body. Although most people associate sickness with flu season, disease-causing viruses and bacteria exist year-round and are only kept at bay by a healthy immune system. Unfortunately, scientific research has proven that many modern lifestyle and environmental factors contribute to a compromised immune system, making the body more susceptible to infection. These include factors such as chronic stress, poor nutrition, lack of sleep or physical exercise, smoking, and environmental toxins, as well as exposure to immune-compromising environments such as airplanes, restaurants, and classrooms. To counter these trends, health-conscious consumers are increasingly seeking safe, innovative immune support products that are scientifically proven to boost immunity.



NutraGenesis introduces ImmuNutrin™, the branded, patent-pending immuceutical that was specifically formulated from seven revered, immune-boosting, medicinal mushrooms and botanicals to support healthy immune function. Scientifically proven in both *in vivo* and *in vitro* scientific research, ImmuNutrin™ can be counted on to provide daily immune support for both healthy and immunocompromised consumers.

ImmuNutrin™ – Unprecedented Combination of Proven Immunomodulators

ImmuNutrin™ is a patent-pending, clinically-proven extract derived from a novel combination of four renowned medicinal mushrooms and three immune modulating plant based compounds. The bioactives are potent, immunomodulating hemicellulose polysaccharides containing arabinoxylane and β -glucans that have been partially broken down during the extraction process to increase absorption and bioavailability. The mushroom complex in ImmuNutrin™ includes Maitake (*Grifola frondosa*), Shitake (*Lentinula edodes*), Reishi (*Ganoderma lucidum*), and Brazilian mushroom (*Agaricus Blazei*). The botanicals in ImmuNutrin™ are rice bran (*Oryza sativa*), olive leaf (*Olea europaea*), and wild yam (*Dioscorea villosa*). Numerous scientific studies have demonstrated that each of these ingredients, independently, is a potent immunomodulator. Combined together and extracted in ImmuNutrin's patent-pending formulation, they form a powerful, reliable, highly bioavailable immuceutical that helps the body defend itself against invading pathogens.



ImmuNutrin™ – Extensively Researched for Proven Effectiveness

ImmuNutrin™ was designed to deliver immune support and prevent sickness when taken daily. To demonstrate its effectiveness, extensive *in vivo* and *in vitro* research studies have been conducted. Two human clinical trials have demonstrated that ImmuNutrin™ intake results in increased levels of important immune cells, including natural killer cells, helper T cells, cytotoxic T cells, and B cells as well as increased immune functional activity. This increased immune support was associated with no viral illness in 16 out of 18 study subjects over a two month period. Several *in vitro* studies have also demonstrated that ImmuNutrin™ increases nitric oxide (NO) release by macrophages as well as macrophage phagocytic activity, both important factors in immune defense.

Safety and Stability

ImmuNutrin™ has an excellent safety profile. The clinical studies involving ImmuNutrin™ show that it is well tolerated and is not associated with any adverse effects after prolonged use on a daily basis or at high dosages. Numerous treatises and pharmacopoeia report no side effects associated with intake of ImmuNutrin's mushroom and botanical ingredients. ImmuNutrin™ is produced using the finest ingredients and is extracted using a water-based method that is free of solvents. Stability studies indicate that ImmuNutrin™ is stable for up to three years after manufacture.

ImmuNutrin™ Features and Benefits

- Novel blend of immunomodulating mushrooms and botanicals
- Protected by multiple U.S. patents
- Clinically proven *in vivo* and *in vitro* models
- Substantiated structure/function claims
- Well-defined chemical composition
- Water-based extraction- no solvents used
- Vegetarian

Unprecedented Structure/Function Claims for Immune Support

ImmuNutrin™ features potent, substantiated structure/function claims in the area of immune support. These claims are in accordance with the requirements of the Dietary Supplement Health and Education Act of 1994, and have been submitted to the Food and Drug Administration accordingly.

- Helps support healthy immune function
- Helps support the body's immune defenses
- Helps support cellular defenses
- Helps promote immune defenses for health and well-being
- Helps maintain immune defenses for good health and well-being

Product Summary

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How the Immune System Works

The immune system defends the body from attack by foreign pathogens. It is an extraordinarily complex system that relies on an elaborate and dynamic network of immune cells that patrol the body. The majority of immune cells are white blood cells. There are several types of white blood cells, each with its own function, which act synergistically to eliminate infection. T cells help destroy infected cells and coordinate the overall immune response. B cells make antibodies which bind to pathogens and signal them for destruction by other cells. Macrophages and neutrophils engulf invaders through a process called phagocytosis, and then digest and destroy them enzymatically and through the generation of reactive oxygen species. Natural killer cells release small granules of proteins that enter target cells, causing them to die by apoptosis (programmed cell death). Antigen-presenting cells help identify a pathogen so it is recognized by other immune cells as foreign and needing to be destroyed. Finally, cytokines and chemokines are chemical messengers produced by immune cells that coordinate the overall immune response by signaling other immune cells to become active, multiply, or die.

ImmuNutrin™ – Clinically Proven to Boost Immunity and Prevent Sickness

Two human clinical trials have been conducted at the University of Miami School of Medicine that demonstrated the immune-boosting power of ImmuNutrin™ supplementation. In an open-label study involving 18 subjects, levels of natural killer cells, helper T cells, cytotoxic T cells, and B cells all increased over 10%, compared to baseline levels, two months after initiation of supplementation with 1000 mg per day of ImmuNutrin™. Total lymphocytes increased 18% compared to baseline levels ($p \leq 0.05$). During the study, 16 of 18 subjects reported no symptoms of viral or bacterial infection, indicating that the heightened immune response was associated with prevention of sickness.

The same research group conducted a follow-up study with ImmuNutrin™ to determine its influence on natural killer cell cytotoxicity (NKCC). The NKCC test, which evaluates the functional activity of natural killer cells, is a more precise measure of immune activity than immune cell number alone. Five subjects were given 3000 mg per day of ImmuNutrin™. The number of natural killer cells increased 19% compared to baseline after two weeks of supplementation, together with a 17% increase in the level of natural killer cell cytotoxicity ($p \leq 0.05$). These results confirm that the increased natural killer cell numbers generated by taking ImmuNutrin™ are associated with greater immune activity in the body.

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Two additional studies found that ImmuNutrin™ increased macrophage activity in a highly significant manner using *in vitro* models. When ImmuNutrin™ was incubated with a mouse macrophage cell line and yeast for one hour it resulted in 65% increased phagocytosis compared to a control ($p \leq 0.001$). This result is consistent with previous studies that showed β -glucans from medicinal mushrooms activate dormant macrophage cells. Unless phagocytic cells become activated, they cannot contribute to immune function. In a second study, ImmuNutrin™ was incubated with a mouse macrophage cell line and the level of nitric oxide (NO) produced by the macrophages was measured, increasing 517% compared to a control ($p \leq 0.001$). Nitric oxide is a free radical that functions as an intracellular messenger and effector molecule. In the immune system, it is produced during macrophage activation and endows macrophages with cytotoxic activity, leading to greater immune defense.

Conclusion

NutraGenesis is pleased to present this totally unique immune support product to the dietary supplement category. ImmuNutrin™ is a powerful, scientifically-proven immuceutical that can be counted on for boosting daily immune defenses for good health and well-being. Its substantiated structure/function claims can be used by marketers of branded dietary supplements to appeal to consumers that seek superior immune support products with clinically proven benefits.



About Us

NUTRAGENESIS LLC

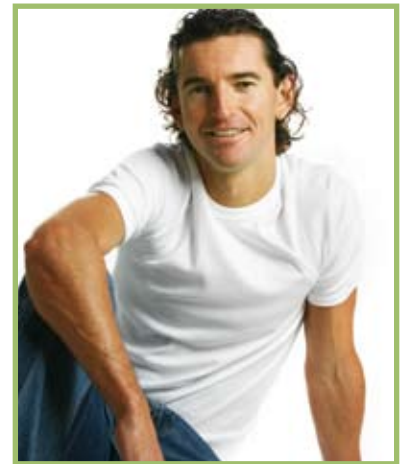
Located in the Connecticut River Valley area of Southern Vermont, NutraGenesis is a diversified nutraceutical product marketing company dedicated to the development and commercialization of proprietary, scientifically researched, health-promoting ingredients. NutraGenesis strives to develop strong, mutually beneficial strategic alliances with its customers by providing proprietary nutraceutical products addressing today's most pressing health issues.



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Corporate Profile

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* These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure or prevent any disease.

1. Aziz, N.H., et al. 1998. Comparative antibacterial and antifungal effects of some phenolic compounds. *Microbios.* 93(374):43-54.
2. Bisignano, G., et al. 1999. On the *in vitro* antimicrobial activity of oleuropein and hydroxytyrosol. *J. Pharm. Pharmacol.* 51(8):971-974.
3. Gao, Y., et al. 2003. Antibacterial and antiviral value of the genus *Ganoderma* P. Karst. species (*Aphyllophoromycetideae*): A review. *Int. J. Med. Mushrooms* 5:235-246.
4. Ghoneum, M. and M. Matsuura. 2004. Augmentation of macrophage phagocytosis by modified arabinoxylan rice bran (MGN-3/Biobran). *Int. J. Immunopathol. Pharmacol.* 17(3):283-292.
5. Ghoneum, M., et al. 2008. Modified arabinoxylan rice bran (MGN-3/Biobran) enhances intracellular killing of microbes by human phagocytic cells *in vitro*. *Int. J. Immunopathol. Pharmacol.* 21(1):87-95.
6. Jan, T.R., et al. 2007. Diosgenin, a steroidal sapogenin, enhances antigen-specific IgG2a and interferon-gamma expression in ovalbumin-sensitized BALB/c mice. *Planta Med.* 73(5):421-426.
7. Kohguchi, M., et al. 2004. Immuno-potentiating effects of the antler-shaped fruiting body of *Ganoderma lucidum* (Rokkaku-Reishi). *Biosci. Biotechnol. Biochem.* 68(4):881-887.
8. Lin, Z. 2005. Cellular and molecular mechanisms of immuno-modulation by *Ganoderma lucidum*. *J. Pharmacol. Sci.* 99:144-153.
9. Lin, Z., and H. Zhang. 2004. Anti-tumor and immunoregulatory activities of *Ganoderma lucidum* and its possible mechanisms. *Acta Pharmacol. Sin.* 25(11):1387-1395.
10. Maeda, H., et al. 2004. Oral administration of hydrolyzed rice bran prevents the common cold syndrome in the elderly based on its immunomodulatory action. *Biofactors* 21(1-4):185-187.
11. Markin, D., et al. 2003. *In vitro* antimicrobial activity of olive leaves. *Mycoses* 46(3-4):132-136.
12. Mizuno, T. and C. Zhuang. 1995. Maitake, *Grifola frondosa*: Pharmacological effects. *Food Reviews Int.* 11(1):135-149.
13. Ooi, V.E. and F. Liu. 2000. Immunomodulation and anti-cancer activity of polysaccharide-protein complexes. *Curr. Med. Chem.* 7:715-729.
14. Rowan, N.J., et al. 2003. Immunomodulatory activities of mushroom glucans and polysaccharide-protein complexes in animals and humans (A review). *Int. J. Med. Mushrooms* 5:95-110.
15. Schavoustie, S.E., et al. 2003. Pilot Study: Effect of PDS-2865 on natural killer cell cytotoxicity. *JANA* 6(2): 39-42.

