A Review of Immune Support Supplements

A review of the published peer-reviewed study conducted at the University of Louisville on natural immunomodulators.

Primary test reviewed over forty of the most popular supplements claiming to support and/or boost immune system.

This report details the findings of the study. Immune system support is one the fastest growing areas for dietary supplements in the United States and abroad. People are becoming more concerned with maintaining their health by supporting their immune systems.

However, the market is full of products claiming to support proper immune system function. The problem is determining which ones actually work and which ones don’t.

The market is overrun by product’s claiming to support your immune system. They are called by many names, immune boosters, immune modulators, transfer factors, etc... The list goes on and on.
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Immune System Support and Your Health

Immune system support is one the fastest growing areas for dietary supplements in the United States and abroad. People are becoming more concerned with maintaining their health by supporting their immune systems. Age is a major factor that contributes to the reduction of proper immune system function.

This reduction occurs throughout our body. Cells, organs directly associated with immune function and immune system cell communication all decrease with age\(^1\).

We are turning to products that claim to support proper immune system function.

Most people first see these changes first with their skin, starting around the age of 25. Wrinkles, age spots and other signs start making appearance around this age. Then comes the hormone production reduction.

**Here are the organs and immune components that start to decay as we age;**

- **Thymus:** This organ performs the important function of producing T-Cells. The main purpose of T-Cells is to identify specific foreign/invader antigens and the call to action and other immune support cells to fight off and protect against the invader and/or disease\(^2\)^\(^3\). They also play a role in the deactivation of immune support cells\(^4\).
- **Interleukin-2 (IL-2):** A lymphokine that is released by helper T. Helps in the production of helper T cells. A lymphokine is any of a various substances released by T cells that have been activated by antigens. With age our body ability to product Interleukin-2 decreases with the decreased performance on the Thymus.
- **B-cells:** Theses cells perform the important role creating antibodies, which perform the role of fighting off infections\(^5\).

**Some more factors you should be aware of;**

- One in eight U.S. women will develop breast cancer in her lifetime\(^6\).
- Cardiovascular disease is the leading cause of death in the U.S\(^7\).
- Businesses, homes and autos release more than 100 million tons of toxic chemicals into the air, land, and water\(^8\).
- More than 40% of all adults suffer adverse health effects due to stress\(^9\).
- More than 2 million patients contract hospital-acquired infections each year.

\(^2\) Biogerontology. 2005;6(3):193-204
\(^3\) http://www.nlm.nih.gov/medlineplus/ency/article/004008.htm
\(^6\) National Cancer Institute
\(^7\) American Heart Association
\(^8\) Greenpeace, Health & Energy
\(^9\) American Institute of Stress

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• The average kitchen dishcloth contains 4 billion living germs.
• The average computer keyboard and elevator buttons contain more germs than a toilet seat.
• Each year, more than 164 million school days are lost due to illness.
• The common cold is actually caused by one of 200 different viruses that produce similar symptoms.
• **One germ can multiply to more than 4 million in just 8 hours.**

These factors contribute to the body’s inability to fight off germs and diseases. As we age our body’s ability to fight these killers off gets harder and harder. Many other factors also contribute to the reduced efficiency of our immune system, however we just covered a few here to show you the importance of proper immune system support as we age.

The human immune system is a complex network of cells, tissues and organs that has evolved to protect us against infection and disease.

**Our bodies are constantly under siege from bacteria, fungi, viruses, parasites and harmful contaminants** and sometimes these challenges overwhelm our immune defenses.

All of the vital hormones, that help maintain our health, such as Thyroid, DHEA, Testosterone, and Pregnenolone fall into a gradual rate of decline after they peak in our twenties. **By age 60 we may only produce 25% of what you did at 20 years of age.**

As our body ages our complex immune system cannot keep up. The thymus gland is one of the main components of the immune system. The thymus produces hormones called **thymosins.** These hormones stimulate the development and differentiation of T lymphocytes. T lymphocytes (T-cells) play an important role in the immune system by stimulating other kinds of immune cells as well. The thymus gland typically atrophies, i.e. wastes away, by age 20, and keeps declining thereafter.

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The Malfunctioning Market

Any of us over the age of thirty should look seriously at safe and effective immune system support. This will help us maintain it at peak operating levels is the goal of everyone who wishes to maintain their health.

However, the market is full of products claiming to support proper immune system function. The problem is determining which ones actually work and which ones don’t. The market is overrun by product’s claiming to support your immune system. They are called by many names, immune boosters, immune modulators, transfer factors, etc... The list goes on and on.

Many manufactures will throw “their” studies in front of you claiming it is all you need see to prove their product is the best, or they may have a list of testimonials from people claiming miracles while taking their product. Many offer no real peer reviewed evidence to back their claims, more on peer-reviewed evidence later.

Can their results be trusted? That question raises some serious issues. While both types may provide evidence to us in locating a real immune support product, they are most likely biased. How can’t they be? If your livelihood relied upon these types of results wouldn’t you make sure they were shown in a positive light?

A test conducted independently of the manufacturers removes this bias issue. These independent tests provide for an unbiased review of the effectiveness and safety of the products in question. This promotes peace-of-mind when purchasing an immune support product.

One trick many manufacturers use is they will claim a study showed that their product produced a specific immune support response. One of the favorites is natural killer cell (NK cells) increase… “increases NK cells by 20%, 25%, 30%, etc…” Is this even the proper scientific method to compare immune support products? Eating dirt can stimulate your immune system11.

NK cells only comprise of about 1% of immune system lymphocyte components12. Lymphocytes make up 20 – 40% percent of overall immune system. While the role of the total amount of lymphocytes make up a majority of immune response, NK’s are only small part of it.

The other issue with lymphocytes and monocytes is the fact that they are part of specific immune response. Specific response, also called adoptive immune response, can take anywhere from 3 to 5 days to occur.

11 Eat Dirt The Hygiene Hypothesis and Allergic Diseases. NEJM Volume 347:930-931 September 19, 2002 Number 12
12 http://www.mc.edu/campus/users/gill/kaciegill.htm

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The problem with this approach is the growth rate of the invaders. For example, bacteria cells colonies can double in size every twenty minutes\(^\text{13}\). If our body just relied on specific immune response we would be dead in a matter of hours because the multiplying germs would override our immune system. For a visual example of how fast germs can multiply click here\(^\text{14}\) (you have to be connected to the internet to view this video).

Bacteria are very small, individually not more than one single cell. However they are normally found in "colonies" of millions and because of this they can multiply very fast.

So how does our immune system slow down, or stop germs immediately? We have what is called innate immune response. This response is a type of “keepers of the front door.” These components act immediately when they recognize a threat. They only know self, i.e. part of our body, from non-self, i.e. not part of our body. When they see something that is not part of our body they attack and consume it. This **IMPORTANT process** is called phagocytosis\(^\text{15}\) and is the start of the specific immune response. They actually eat the invader, similar to how the video game we know as Pac-Man ate the little dots on the video monitor. More on phagocytosis later in this report.

The two main innate immune system components of phagocytosis are;

- Neutrophils
- Macrophages

The neutrophils make up 50 - 70 % of the immune system cells that fight off germs. It is the majority component for the immune system followed closely by Lymphocytes. It is the innate immune response that has the ability to stop the germs in their tracks providing it is up to the task. The specific response, if needed, comes in later to finish off the job started by the innate immune response.

So, as you can see the test results of NK cells just don’t live up to the task of providing sufficient evidence of providing proper immune response.

**A proper test to establish effective immune support would be to compare a wide variety of immune system component responses of both the innate and specific response systems.** If you look at any reputable peer reviewed scientific study you will see the test looks at a variety of responses, not just one. To discover what is a properly conducted test a good place to look is a medical university that has conducted independent tests in the past. This is one of the safest ways to identify materials that provide health related benefits. The most common form of this type of research is called peer reviewed studies.
What are peer-reviewed studies?

These are studies that provide the reviewing individual with the ability to copy the study for themselves. They are published in medical journals that document the studies conducted at medical institutions, universities, hospitals, etc... The list is huge. These journals cover studies conducted on everything, food, disease, genetics, etc...16

If you are a doctor or scientist, professor, etc..., this is where you submit the results of your research work for publication. The article will contain a complete description of what tests were performed, what equipment was used, the material used, what the results were, etc... Everything from A to Z. This allows other researchers to duplicate the test to verify the results you documented in the publication. It adds to unquestionable credibility to the research by allowing other researchers to duplicate the results over and over again.

The publications and their staff are independent from the individuals/universities, etc… who conducted the studies. This is also called evidence based research. Thousands of studies are submitted each year, not many are accepted. Those that are accepted for publication become the "cream of the crop."

Once published in these peer reviewed medical articles many are then added to PubMED, the world's largest peer reviewed medical archive. PubMED can be accessed for free on the internet. It is set up just like a search engine.

Here is the website: www.pubmed.com

Simply type in the material and condition and if there is a peer reviewed article published about it, it may appear here. Pubmed is an integrated, text-based search and retrieval system used at NCBI for the major databases, including PubMed, Nucleotide and Protein Sequences, Protein Structures, Complete Genomes, Taxonomy, and others. It is the largest peer reviewed medical scientific research archive in the world sponsored by the US government.

Here is an example;

16 http://www.medbioworld.com/med/journals/med-journals.html

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The peer reviewed medical results will display below this area. Not just “anyone’s” study will display in this archive. The study has to be first published in a peer reviewed scientific journal before it can appear here.

Experience health researchers use this website to identify effective little known materials. This is a good place to start your research on identifying a material that may actually produce results.

The most popular immune support compounds: Comparing Research Based Immune Support Products

Finding the right immune support product can be dizzying. A day’s worth of reading advertisement after advertisement about how this or that product has superior immune support can confuse anyone. In the end, you're left with only one solid fact: they're just advertisements.

The only bias-free evaluations of immune support products come from scientific research, as discussed previously. Unless you have a degree in biochemistry or a medical doctorate degree, however, interpreting the meaning of the research you read is nearly impossible. If you are able to understand the research, there are a few things you'll want to know about the product:

(1) Does the product actually show effectiveness in immune support?

(2) Is the product of a purity standard comparable to the high purity extracts used in research?

(3) Does the research reveal any mechanism by which the product is supposed to work? If you can't answer "yes" all three of these questions, then you may be throwing your money away if you buy a particular product.

Let's take a look at eight common natural immune support products so you can see for yourself what constitutes a good product, a bad product or one that's a "maybe"-generally, a product that shows some promise but isn't well studied by scientific research. Remember: Products containing more than one ingredient usually consist of a primary ingredient (one that shows the most promise) and several other ingredients that are less likely to be effective.

Let's first look at the immune support products that have almost no long term scientific support:
Bovine colostrum:
This is nothing more than a dried form of the milk that cows produce shortly after giving birth. It provides, among other things, antibodies that temporarily prevent diseases from which the mother cow has already become immune. That's great—if you're a calf. Human diseases and cow diseases are not the same and it's not likely you need immunity from any particular infectious disease that cows get. One disease, however, is shared by both humans and cows. It's called "mad cow disease" or bovine spongiform encephalopathy (BSE). This is one very good reason to stay away from any bovine-derived product. Even if a bovine product has been heat-treated to the point of killing the agent that causes BSE, it's likely that antibodies are destroyed as well17.

Thymic Protein A:
This is supposed to boost T-4 helper white blood cells. The only problem with this product is that science hasn't really caught onto it yet. Research is practically absent and there's every reason to believe that if you still have your thymus gland, you already have all the Thymic Protein A you need.

Transfer Factors:
This term represents a broad category of low molecular weight molecules extracted from the immune cells of an individual immune to a particular disease or tumor type and given to another who is not immune.

There's really no such thing as a "generic" transfer factor that protects one from all immune conditions. So, when you read about the benefit of "transfer factors", be sure to ask, "Which one?" It would be truly amazing to find a collection of transfer factors that actually worked against many significant diseases.

A few popular immune support products actually have scientific potential. There is usually a limited amount of research available and at least one of the three big questions already discussed (effectiveness, purity, mechanism) can be answered18-19.

Uncaria tomentosa (Cat's claw):
This is an extract from the bark of a particular South American tree. It's been shown to protect skin from UV radiation by improving DNA repair. It's also felt to have anti-inflammatory properties. In addition, it increases the number of stem cells that make macrophages and neutrophils—both being infection-fighting cells. It doesn't, however, actually improve the numbers of mature neutrophils and one study it was shown that the because of the lack of standardization the effectiveness of Uncaria tomentosa was sacrificed. Perhaps the greatest concern was the finding in another study that extracts of this product actually stimulated the growth of leukemia cells by 96%20-21.

Echinacea:
Extracts of this natural product have been widely studied, with results showing some anti-inflammatory effects. One study found that Echinacea extracts were not effective in preventing respiratory infections and that in only nine of 15 comparison studies did it shorten the duration of a cold.

In another study, Echinacea was one of a trio of products that collectively shortened the duration of a cold by half a day. Finally, another study felt that Echinacea induced a "nonspecific immune response" in those who take it once they’re ill. No specific mechanisms of action, however, were uncovered. Mechanisms of action is defined how a nutrient, drug or supplement works in the body\textsuperscript{22-23}.

Alpha-glucan:
This is a polysaccharide extracted from certain mushrooms. It’s been difficult to extract and mass-produce but it has been shown to have activity promoting natural killer cell activity in mice. It also appears to prevent the growth of cancer cells. One study, however, found that its anti-cancer properties were only significant if the extract was first chemically-treated to change its molecular properties.

More importantly perhaps is the fact that almost all available research on Alpha-glucan are dated more recently than 2004 and often refer to this product as "new" and "promising". Clearly, there hasn't been enough time to clarify this product's properties\textsuperscript{24-25}.

Astragalus membranaceus:
This Chinese herb appears to stimulate the bone marrow to make red blood cells. It also appears to promote the maturation of cells that fight infection. It seems to help macrophages work better. Lymphocytes, also important in immune function, mature faster in the presence of this product. Interestingly, it also happens to contain a known immune support product called Beta-glucan-a product you’ll soon see has a great deal of scientific evidence to support its effectiveness as an immune support product\textsuperscript{26-27,28}.

\textsuperscript{27} Lee KY, Jeon YJ. "Macrophage activation by polysaccharide isolated from Astragalus membranaceus." Int Immunopharmacol . 2005 Jul;5(7-8):1225-33.

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AmbrotoseT and Aloe Vera:
These products are put together because they both contain the same glyconutrient properties. Glyconutrients are sugar-based food products that are used to make larger polysaccharides in the body. AmbrotoseT contains eight simple sugars with the most prevalent ones being those also used in aloe vera. Some studies have shown that at least one sugar enhances macrophage activity when added to albumin (a common blood protein).

Another study indicated it may improve natural killer cell activity in those with chronic fatigue syndrome. The best study indicated that aloe vera extracts improve the absorption of both Vitamin C and Vitamin E. You'll see (below) that they may have some potential, too. Aloe vera, however, was found to have some genotoxic properties, meaning that it may negatively affect the genetic makeup of cells29.

Vitamin C:
Surprisingly, the information on Vitamin C is not as promising as one would think. It has anti-oxidant properties and clearly helps in the immune system of severely deficient individuals (such as those in third world countries). It seemed to improve non-specific immune parameters in an animal model.

A four-week intervention trial in healthy subjects showed no effect on immune parameters in subjects receiving high dose Vitamin C and E. Another combined Vitamin C and E trial on sick children showed no benefit to the immune system30-31-32.

Vitamin E:
The best effectiveness as an immune support is shown in elderly nursing home patients and in those who were treated with Vitamin E and selenium, too. Vitamin E appeared to enhance the immune function and reduce the rate of respiratory infections in the elderly but the mechanism of this is unknown. It's felt that the elderly are somewhat deficient in Vitamin E, which may account for why it helps them preferentially33-34.

Only one of the common naturally-derived immune support products appears to satisfy the requirements needed to consider it to be "good" for immune support.


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**Beta glucan:**
This is a long-chain polysaccharide isolated from Baker's yeast and other fungi. Research on Beta glucan dates from almost forty years ago to the present time. Its mechanism of action has been well documented. Peer reviewed and researched studies shows that it binds to and promotes the function of macrophages (infection-fighting cells) by binding to its dectin-1 receptor.

It also binds to the CR3 receptor on neutrophils and enhances their ability to kill tumor cells and pathogens. It stimulates the formation of bone marrow stem cells and promotes their maturation to all types of infection-fighting cells. It appears to be effective against a number of conditions, including radiation injury, infectious diseases and immune-responsive cancers.

Patent protected technology exists that can mass-produce Beta-glucan to a purified state of at least 80%. A good provider of Beta-glucan will be able to tell you the purity of their product and provide you with independent studies carried out by well respected labs. The purity level is very important. The market is saturated with inferior products claiming to contain Beta Glucan).

Below is a graph of various popular immune support products. This graph is the result of an independent study that shows the immune response of specific immune support products. The specific response studied was neutrophils phagocytosis.

Neutrophils are a type of white blood cell that plays a major role in the body's defense against bacteria, viruses, and fungi

Phagocytosis is defined as the engulfing and ingestion of bacteria or other foreign bodies by phagocytes. It is an important defense against infection and disease.

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As you can see, there is a big difference among these products. Some products have almost no scientific support while others, like the high quality Beta-glucan product used in this study, have decades of supportive research and include research into the mechanism of action of the product.

As mentioned, you be the judge.

The material used as the control was saline solution, i.e. salt water. The measured amount of each product used was 100 ug. As the results show, most of the products provided about the same immune response as the salt water control, whereas the high quality Beta-Glucan product provided almost a doubling of immune response. To review the independent tests on the top Beta Glucan products click here.

**Material Chosen for This Report:**

Forty of the most popular immune support products were tested by the University of Louisville, Department of Pathology.

This was a preliminary test to determine which products should be chosen for the more complicated, definitive test. The results of the tests conducted are found on the graph below.

This first series of tests revealed some startling results.

Many of the products showed little immune support activity. As a matter of fact a majority of these products produced the same results as the negative control.

Among the products tested were Ambrotose, Wolfberry, Vitamin E and Transfer Factor, etc... Is one of your products among them?
As you can see some products produced a response lower than negative control, while two products produced almost a doubling of immune response. Since we are looking to purchase a safe and effective immune system support product, why would we settle for second best?

The most revealing aspect of this test was the material used as the negative control. It was saline solution, i.e. salt water. As we can see, most of the products provided about the same immune response as the salt water control, whereas the high quality Beta-Glucan product provided almost a doubling of immune response. The saline solution immune response is shown in yellow with black diamond and found on the right hand side of the graph.

Some products have almost no scientific support, while others like the high-quality Beta-glucan product used in this study, have decades of documented peer reviewed supportive research.

These are ongoing tests so more products are being added all the time. To date over forty products have been tested.

**Cost and Dosage Analysis:**
The study also looked at what type of immune response was shown based upon the dosage amount. The test showed how much of a dosage was required to reach the peak response level of the product that provided the best response. The higher the response level, the better our immune systems can react to, and overcome an invader.

This test helped us determine how much more of a lower responding product is required to reach the same level as the top performing product. So, if a product

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required thirty two times (32X) the amount of material to reach or come close the response level of the best performing product, it would cost you 32X the amount. This is the cost multiplication factor required (CMF) to produce the same, or similar results. We call this CMF. See how you can compute this for yourself;

Product A cost $12.95 per bottle and requires 32 X the amount to produce the same immune response results.

- $12.95 x 32 = $414.40

The top performing product cost $69.95 per bottle and produces the same amount and 32 X the amount of product A.

- $69.95 x 1 = $69.95

Savings: $414.10 - $69.95 = $344.15 savings for the same, or similar immune response, a 413% savings.

Below is the cost multiplication factor required (CMF) for each product tested as compared to the top performing product.

- Wellumne by Biothera®
- RM10®

Products requiring a minimum of eight times (4x) the amount:

- Beta 1,3/1,6 Glucan manufactured by NOW®
- MaitakeGold 404® manufactured by Tradeworks Group, Inc.
- PSK Krestin® manufactured by Kureha Corp.

Products requiring a minimum of eight times (8x) the amount:

- Beta 1,3/1,6 Glucan manufactured by NOW®
- MaitakeGold 404® manufactured by Tradeworks Group, Inc.
- PSK Krestin® manufactured by Kureha Corp.

Products requiring a minimum of thirty-two times (32x) the amount:

- Epicor™ manufactured by Diamond V
- Immutol® manufactured by Biotec ASA
- RM-10™ manufactured by Garden of Life

Products requiring a minimum of sixty-four times (64x) the amount:

- Beta 1,3 Glucan manufactured by Vitamin World
- Beta Glucan 1,3 Glucans manufactured by Solgar®
- BETAMax manufactured by Chisolm Biological Labs
- Beta Sweet: Southeast Asia
- BioBran® manufactured by Daiwa Pharmaceutical Co., Ltd.
- Glucagel™ manufactured by GraceLin Ltd.
- Immunity Booster™ manufactured by Twinlab®
- Immune Builder® manufactured by Mushroom Science
- Immune Factors™ manufactured by Andrew Lessman
- Immune Renew™ manufactured by NOW®
- Manapol® manufactured by Carrington Labs

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Based on the preliminary results the university chose seven Beta glucan products for the definitive test. Beta glucan is unknown to a majority of the general public. Many researchers consider it to be one of the most effective immune enhancing substances ever discovered. With over 50 years of peer-reviewed studies conducted on this material it’s immune support effects are without question. It has over 1,600 general peer reviewed research papers.

If you wish to conduct your own review on this material pubMED provides you with the perfect opportunity to do so. Simply go to www.PubMED.com and type in the following:

- or -

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Properly extracted, Beta 1, 3-D glucan has been shown to be completely safe and non-toxic. Our material is extracted from the cell walls of bakers yeast (Saccharomyces cerevisiae), a food source, is considered one of the most effective raw material sources. Bakers yeast, and their extracts, have been given a GRAS rating. This is one of the highest, if not the highest safety rating a substance can achieve. The specifications for this rating can be found in 21CFR184.1983 -- Sec. 184.1983.

The Controversy Over Quality:
Beta Glucan was the perfect choice because of the controversy that surrounds glucan products these days. This controversy centers around the quality issue(s) of purity level and molecule linkage. In order to be effective the material must contain the proper glucan purity level and 1,3-d molecular linkage.

That is where the “smoke-and-mirrors” comes into play. Many products may contain Beta glucan, however it is the products that contain the Beta 1, 3-d glucan that provides us with the immune support results we need.

The serious researcher will discover that many manufactures hide or do not apply these generally accepted standards to their manufacturing process. Many products may contain trace amounts of the substance, or are produced using an inferior extraction processes that renders the product practically useless. Further, proof of quality/content by independent verification is seldom made available to consumers or researchers, if available at all, except upon specific request or demand.

The market is rife with fraudsters claiming that there product is the purest. For a majority of under-performing Beta Glucan products it's easy to spot them. But sometimes it's not so easy, as a matter of fact it may be very difficult.

Peer reviewed research has shown that the critical cells of our immune system have specific receptors for the Beta Glucan macromolecule. It's almost as if nature "designed" beta glucan to support our immune systems. This receptor plays a very important role for immune system response.

Inferior products cannot accomplish the "turning on" of the glucan receptors because the Beta 1, 3-d molecule is covered and masked by the contaminants contain in them.

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Some of these contaminates, namely fats, greatly reduce the effectiveness of the product. On the other hand, if a Beta glucan product contains an excess amount of proteins allergic reactions may ensue.

All the important historical peer reviewed medical research and findings have shown that in order to be effective the 1,3 d glucan linkage must above 80% or higher and the higher the percentage over the 80% threshold the better the immune response.2

High quality Glucan products reflect the characteristics of the Beta 1, 3-D glucan material used in the peer reviewed medical literature. These quality/characteristics were developed over many years of research at some of the worlds most prestigious universities. Here is just a small list of who has tested, or sponsored tests on this material;

- Harvard
- Tulane
- Mayo Clinic
- MIT
- Armed Forces Radiobiology Research Institute
- Canadian Armed Forces
- Sloan-Kettering Cancer Center
- National Institute of Health
- Baylor
- USDA

The peer reviewed quality standards that have been developed through testing is as follows;

- The carbohydrate (glucan is a polyglucose) content is a least 94% when added together. This is the combination of various beta glucan linkages, including, but not limited to;
  - 1, 3 linkage (the immune support linkage)
  - 1, 6 linkage
  - 2, 3 linkage
  - 3, 6 linkage
- The 1, 3 linkage portion of the glucan is at least 85%. (textbook perfect).
- The 1, 6 linkage is within the textbook limits to confirm a proper molecule
- The other glucan linkages are appropriate according to textbook limits
- There are no signs of excess mannose or glucose. (Spiking to create false data)
- Independent labs confirm material has virtually non-detectable levels of fats (making the material indigestible as an immune modulator) and proteins (causing possible complications with persons with allergies).
- Independent labs confirm that the average particulate size of is from 0-5 microns. (Czop's work at Harvard showed a 5 micron average) Of the material over 1 micron, the average size is from 3-5 microns. The sub-micron material shown by all labs is quite substantial (One lab indicates some 99%). The product sold by Sigma Chemical, similar in quality sells for over $200 per capsule. That product has only a 27% sub-micron population - The Beta Force line of products have been shown to far exceeds that amount.
- Microphotography and expert analysis using standard scientific methods at a major university show that the Beta glucan material possess the same characteristics as those microphotographs published in respected peer-reviewed articles. The data will show show that the material was free from bacteria, coliforms, and other undesirable components.

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Microphotography and expert analysis using standard scientific methods at a major university show that the material possess the same characteristics as those microphotographs published in respected peer-reviewed articles. Their analysis also will show that products were free from bacteria, coliforms, and other undesirable components.

**IMPORTANT:** All the testing that has shown the amazing results has been high percentage active Beta 1, 3-D Glucan linkage, 80% and higher, NOT the 60%, 70% or 75% material. Linkage and content level go hand-in-hand. You cannot have one without the other. Many tests have been independently conducted on high quality material, on practicality every know condition as well as general immune support and the results have been amazing.

**Independent Test Results on the Seven Products**

The University of Louisville then conducted definitive tests on the seven Beta glucan products and submitted the results of the study to JANA. JANA accepted the article of publication. The Journal of the American Nutraceutical Association is a peer-reviewed medical journal. It is the leading peer-reviewed journal on nutraceuticals and nutrition.

JANA contains original research articles not found anywhere else, comprehensive review articles, timely editorials, opinion articles, book reviews and interviews with leaders in the fields of nutraceuticals, MD's, researchers and others that are involved in the clinical use of nutraceuticals.

**Test Criteria:** The tests were conducted on a range of immune support functions, not just one like many manufacturers may provide. The range of tests included the following;

- Phagocytosis
- Splenocytes surface markers
- Synthesis of Cytokines
- Stimulation of antibody response

The range of tests conducted on the seven products involved both types of responses the immune system provides;

- the innate, and;
- the specific

As discussed earlier, innate immune response is a general and first response to a threat upon our body. Cells of the innate immune respose system only recognize self from non-self. In other words, “should it be here, or should it not.” If not it will attack and devower it. It does not confer long-lasting immunity against the invader.\(^{43}\)

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\(^{43}\) http://www.faculty.virginia.edu/smithlab/innate_immunity.htm

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One of the important facts of the specific immune response, which is much slower than the innate immune response, is it retains “memory.” If the immune system comes in contact with the threat again it knows how to react and can combat and overcome the threat much more effectively. Each threat is "remembered" by an antigen. An antigen is a molecule that creates an immune response.

Test One – Phagocytosis:
Phagocytosis is the engulfing and ingestion of bacteria or other foreign body invaders by phagocytes. Phagocytes are the white blood cells of the immune system who’s primary responsibility is to destroy diseased cells or invaders in our body.

Phagocytosis is a primary response of the innate immune system of the body. Without proper and effective Phagocytosis we would succumb to disease and/or infection very quickly. There are specific cells that are called Phagocytes (pronounced: fah-guh-sytes) that provide this immune function. They are;

- Macrophages
- Microphages are primarily neutrophils. Other microphages are;
  - Eosinophils, and;
  - Basophils

It is important to understand the average amount of each of these components in the body. This will help identify which components play the most important role in immune support.

- Neutrophil 50 - 70 %
- Eosinophil 2 - 4 %
- Basophil 0, 5 - 1 %

As you can see, you have one majority and two minorities. While all are important the neutrophil is clearly the leader in innate response.

Test Two – Splenocytes Markers:
Splenocytes are spleen cells (e.g. lymphocytes, granulocytes, other immune cells). These cells play an important role in regulation of immune responses, including CD4 and CD8. The amount of surface markers helps determine immune response characteristics and play a role in specific immune response.

Test Three - Synthesis of Cytokines:
Cytokines are a non-antibody proteins produced by leukocytes and non-leukocytic cells that can be a "communication line" between cells and can influence the behavior of cells in the generation of an immune response. Cytokines include interleukins, lymphokines and cell signal molecules, such as tumor necrosis factor and the interferons. They can trigger inflammation and respond to infections. They help regulate the immune system. The quicker Cytokines are synthesized the more

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44 http://en.wikipedia.org/wiki/Phagocytosis
45 http://en.wikipedia.org/wiki/Phagocyte
46 http://www.mc.edu/campus/users/gill/kaciegill.htm

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effective the response rate of the immune system to a threat upon it. Cytokines work both for the innate and specific immune response and therefore play a very important role in the immune system\textsuperscript{47}.

Test Four - Stimulation of antibody response:
An antibody is a product of the immune system that helps the immune system recognize and fight infections and other invaders in the body. It is directly related the specific immune response. It identifies and neutralizes bacteria, viruses and other threats\textsuperscript{48}. The faster the response of antibodies to an infection or invader the more effective the immune system response will be against it.

The study revealed which immune support products provided the best results and which ones did not. Many products claim to help our immune system do not even provide proof of their actual claim. Others use a single test result to make the claim, usually the rate of increase of Natural Killer Cells, which is a single component of the immune system. This theory is flawed because it is only looking at one response characteristic and the total amount of natural killer cells comprises of around only 1\% of the total of immune support components. The immune system is a complex system comprising of many components.

What Did the Tests Reveal?
See the next page for the answer to that question…

\textsuperscript{47} http://en.wikipedia.org/wiki/Cytokine
\textsuperscript{48} http://en.wikipedia.org/wiki/Antibody

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As the results show, Beta Force Glucan 300 far outperforms all the competitors. The graph above details the independent test results of the seven Beta glucan products tested at the University of Louisville that was published in JANA. The title of the paper was “An Evaluation of the Immunological Activities of Commercially Available B1,3-Glucans.” The dosage amounts were identical for each product.

As the results show, there is a big difference among immune system support products.

Beta Force Gucan 300 offers customers a comprehensive assay detailing both purity and potency. No one in the industry has ever matched their purity and potency, regardless of claims. Many competitors are unwilling to provide you with such information, calling it proprietary. As a consumer, paying for a product based upon specific claims of purity and potency, you are entitled to know what you have bought.

### Comparison of Individual Glucans

<table>
<thead>
<tr>
<th>Name</th>
<th>Phagocytosis</th>
<th>CD expression</th>
<th>IL-2 production</th>
<th>Antibody formation</th>
<th>Dosage amount and Cost Multiplication Factor (CMF)</th>
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<td>+</td>
<td>-</td>
<td>-</td>
<td>64X</td>
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<tr>
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<td>+/-</td>
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<td>++</td>
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</table>

Beta Force glucan 300 is our answer for the lowest cost, safest and most effective immune support our money can buy.

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**GLUCAN 300 – FREE SHIPPING ON ORDERS OF $50 OR MORE**

For Online Purchases only

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**TO ORDER:**

[http://www.beta-glucan-info.com](http://www.beta-glucan-info.com)

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