



wellmune®

Research Summary





A natural food, beverage and supplement ingredient clinically proven to help strengthen the immune system.



Introduction.

The powerful and consistent clinical research supporting Wellmune® makes it an ideal immune health ingredient for delivering real health benefits to consumers.

Wellmune has been shown to help:

- Improve general immune health.
- Maintain overall physical health.
- Protect against the harmful effects of stress.
- Promote healthy energy levels and mental clarity.

Wellmune is:

- Supported by over a dozen clinical studies.
- A patented and award-winning global brand.
- Kosher, Halal, gluten-free, non-allergenic, non-GMO and organic compliant.
- Safe for everyday consumption with broad regulatory approvals.

*Immune health is a **top functional benefit** that consumers want in foods and beverages, second only to general health and wellness.*

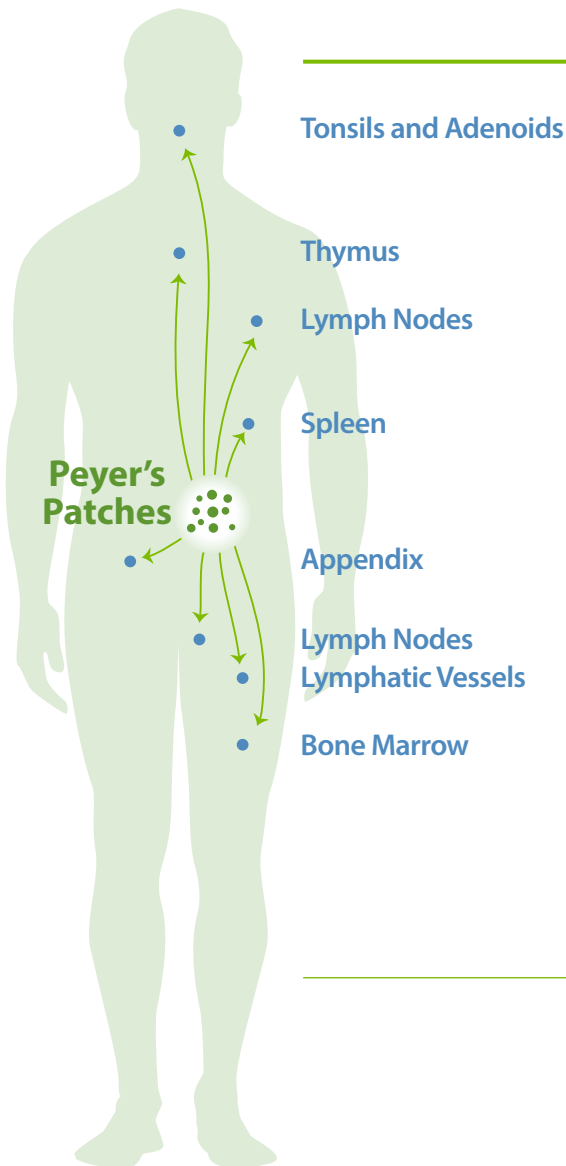
2015 Global Data survey of nearly 28,000 consumers in 31 markets.

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Wellmune has regulatory approval in major markets around the world, including GRAS status in the U.S. and novel food approval in Europe and China. Focused on immune health benefits, products containing Wellmune are available in more than 60 countries.

The Wellmune® mechanism of action.

Wellmune interacts with human immune defenses that have evolved over thousands of years to protect the body. And importantly, **Wellmune supports immune function without overstimulating the immune system.**



- Wellmune is a natural beta 1,3/1,6 glucan highly purified from the cell wall of a proprietary baker's yeast (*Saccharomyces cerevisiae*).
- Consumed orally, Wellmune is taken up in the body by the Peyer's Patches in the intestines.
- Immune cells called macrophages (located in the Peyer's Patches) ingest Wellmune and travel to the immune organs throughout the body.
- Macrophages break down Wellmune into smaller fragments that bind to neutrophils, the most abundant immune cells in the body.
- Primed by Wellmune, neutrophils move more quickly to recognize and kill foreign challenges.

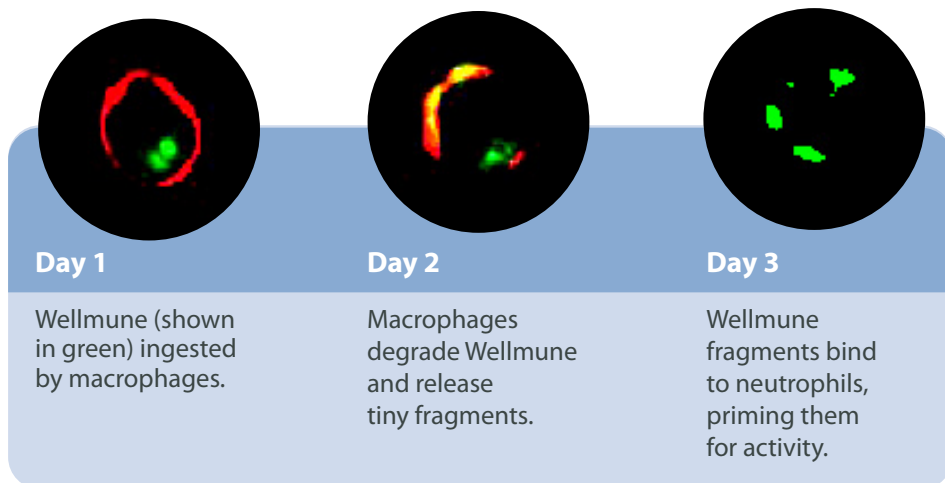


Research related to the mechanism of action.

Scientific understanding of Wellmune's mechanism of action in the body is well documented in published, peer-reviewed research. Researchers discovered Wellmune's mechanism of action through a series of experiments:

- Studies tracked fluorescently dyed Wellmune as immune cells transported it throughout the body (Figure 1). **Within days, Wellmune is carried** to the spleen, bone marrow and other immune organs.
- A study observed **significant improvement in the killing activity of immune cells**. Phagocytic cells, which literally engulf and destroy foreign challenges, showed greater microbial killing in subjects who had taken Wellmune.
- Expanded research focused on immune biomarkers linked health benefits to changes in immune function. While more research is needed, the studies **confirm immunological activity consistent with the presence of Wellmune**.

Figure 1:
Wellmune® in Action



"Mechanism by which Orally Administered Beta-1,3-Glucans Enhance the Tumorcidal Activity of Antitumor Monoclonal Antibodies in Murine Tumor Models." (2004) *Journal of Immunology* 173:797-806.

The human immune system is complex, and investment into deeper understanding of how Wellmune interacts with the body is ongoing. In fact, recent research has shown that in addition to Peyer's patches, Wellmune is also taken up into the body by intestinal villi – the tissue structures that make up the majority of the large and small intestines. The same study also identified additional types of immune cells (dendritic cells and mast cells) that can interact with Wellmune.

"A β -glucan-based dietary fiber reduces mast cell-induced hyperpermeability in ileum from patients with Crohn's disease and control subjects." (2017) *Inflammatory Bowel Diseases* 24:166-178.



Wellmune® product applications.

Wellmune is designed for food, beverage and supplement applications, and is stable under the vast majority of manufacturing processes. It is available in two powder forms:

- **Dispersible** for food and select beverage applications.
- **Water soluble** for certain beverage applications with clarity or other manufacturing requirements. In water at 1mg per milliliter, soluble Wellmune is odorless, clear and has a mild if any taste.

Wellmune® research: proof of efficacy.

Clinical studies have consistently demonstrated:

- The ability of Wellmune to **support healthy human immune responses** to stress in a variety of populations.
- That Wellmune **reduces the incidence of upper respiratory tract infection symptoms** and **improves an overall sense of well-being** in people of all ages experiencing physical or lifestyle stress.



The complete body of research supporting Wellmune includes additional clinical research, numerous preclinical studies and human biomarker research. Beginning on page 32 is a bibliography of clinical and preclinical research related to Wellmune.

Ongoing research continues to advance the science behind Wellmune. For more information on Wellmune, immune health and additional resources, please visit www.wellmune.com.

Clinical Studies Table of Contents

| Focus | Study | Type | Published | Details |
|--|----------------------------------|--|--|---------|
|  | Texas Marathon II | Physical Stress Health Effects (Beverage Matrix) | Journal of Dietary Supplements, 2018 | page 8 |
|  | Exercise Stress | Biomarkers | Frontiers in Physiology, 2017 | page 10 |
|  | Older Adults | Health Effects and Biomarkers in Older Adults | Nutrition, 2017 | page 12 |
|  | Children | Health Effects in Children | Journal of Nutrition & Food Sciences, 2016 | page 14 |
|  | Texas Marathon | Physical Stress Health Effects | Journal of Dietary Supplements, 2013 | page 16 |
|  | Exercise Stress | Biomarkers | British Journal of Nutrition, 2013 | page 18 |
|  | Allergy | Allergic Rhinitis Health Effects | Food Science & Nutrition, 2013 | page 20 |
|  | Medical Students | Physical and Lifestyle Stress | Nutrition, 2012 | page 22 |
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Children



Older Adults



Athletes



Stress





General

*Pending publication

(continued)

Clinical Studies Table of Contents (continued)

| Focus | Study | Type | Published | Details |
|--|----------------------------|--------------------------------------|---|---------|
|  | California Marathon | Physical Stress Health Effects | Journal of Sports Science & Medicine, 2009 | page 28 |
|  | Cold/Flu | Health Effects in General Population | Journal of Applied Research, 2009 | page 30 |
|  | Firefighters | Physical Stress Health Effects | Presented at American Society of Sports Medicine*, 2008 | page 31 |



Children



Older Adults



Athletes



Stress



General

*Pending publication



Athletes

Wellmune® helps support immune health of athletes through beverage applications.



Study: Texas Marathon II, Beverage Matrix

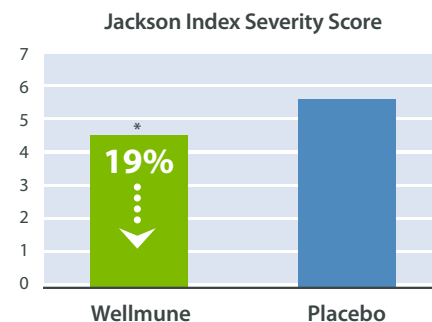
Validating previous research with athletes, Wellmune reduced total severity of upper respiratory tract infection (URTI) symptoms and duration of symptoms during marathon training and post-marathon participation. It also further supports the ingredient's ability to help strengthen the immune system through a food or beverage application.

Study Protocol

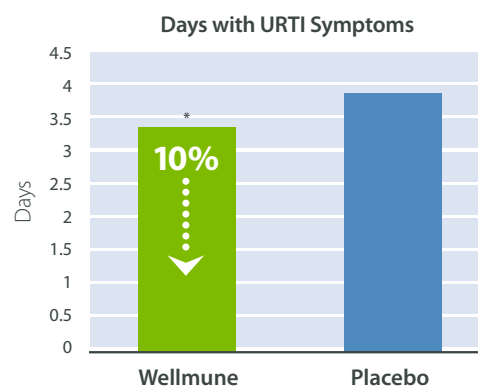
| | |
|-------------------|--|
| Study Site | Biofortis, Chicago, IL USA |
| Population | 202 healthy runners (100 men, 102 women) who completed the 2017 LiveStrong Marathon in Austin, Texas |
| Age | 18-65 (average 38 years) |
| Design | Randomized, double-blinded, placebo-controlled, parallel arm study |
| Duration | 91 days |
| Serving | Participants consumed one of the following once daily through a nutritional dairy-based beverage (250 mL): <ul style="list-style-type: none">• 250mg Wellmune• placebo |
| Details | Participants consumed a nutritional dairy-based beverage with Wellmune or placebo for 45 days pre-marathon, the day of, and 45 days post-marathon. Subjects completed a daily online survey assessing compliance, training status and URTI symptoms. URTI occurrence and severity were evaluated using the validated Jackson Index and confirmed by the study physician. |

Results

Participants consuming the beverage with Wellmune saw a **19% reduction in the severity of URTI symptoms** compared with the placebo group.



Participants consuming the beverage with Wellmune had a **10% decrease in total symptomatic days** compared with the placebo group.



*p≤0.05, **p≤0.01, ***p≤0.001

"Beverage Containing Dispersible Yeast B-Glucan Decreases Cold/Flu Symptomatic Days After Intense Exercise: A Randomized Controlled Trial." (2018)
Journal of Dietary Supplements.

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General

Wellmune® provides immune support for those of average fitness levels.



Study: Exercise Stress

Wellmune showed improvement in immune health both during and after strenuous exercise for adults of average fitness levels. This study supports previous biomarker research results conducted with athletes.

Study Protocol

| | |
|-------------------|--|
| Study Site | Applied Physiology Laboratory, University of North Texas, USA |
| Population | 109 healthy adults (50 men, 59 women) |
| Age | 18-40 (average 21 years) |
| Design | Randomized, double-blinded, placebo-controlled, crossover study |
| Duration | 10 days supplementation with Wellmune or placebo; seven-day washout period; 10 days supplementation with Wellmune or placebo |
| Serving | Participants were split into two groups, and consumed the following once daily for 10 days, in two separate instances: <ul style="list-style-type: none">• 250mg Wellmune• placebo |
| Details | <p>After the 10 day supplementation period, participants jogged on a treadmill for 90 minutes in a hot, humid environment.</p> <p>Blood samples were collected on day zero, and immediately before and after the exercise session on day 10.</p> |



Results

Confirming previous biomarker research with athletes, this study showed that Wellmune prevented the exercise-induced decline (below starting levels) of monocytes and key cytokines in people of average fitness levels.

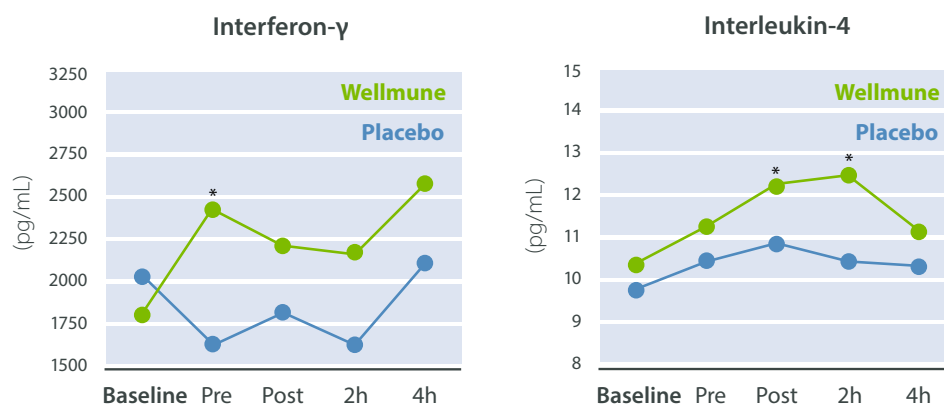
- **Wellmune prevented the drop of white blood cells that typically occurs following intense exercise.** During recovery from exercise, the Wellmune group showed a:

- 43% (2-hrs into recovery) and 38% (4-hrs into recovery) increase in the number of killer T-cells circulating in their blood compared to placebo.
- 27% (2-hrs into recovery) and 29% (4-hrs into recovery) increase in the number of circulating monocytes compared to placebo.

- **Wellmune provided enhanced immune responses to a simulated bacterial challenge:**

The Wellmune group had higher levels of key cytokines following lipopolysaccharide (LPS) stimulation suggesting the priming of leukocytes that mediate immune responses.

Wellmune supports immune health during and after strenuous exercise in people of average fitness levels by maintaining higher levels of LPS-stimulated cytokines.



No effect on IL-10, MCP-3, MIP-1α, MIP-1β, or TNF-α.

*p≤0.05, **p≤0.01, ***p≤0.001

"Oral Supplementation with Baker's Yeast Beta Glucan is Associated with Altered Monocytes, T Cells and Cytokines Following a Bout of Strenuous Exercise." (2017) *Frontiers in Physiology* 8:786.



Older Adults

Wellmune® supports the immune health of older adults.



Study: Older Adults

In a cold-and-flu season pilot study with older adults, Wellmune demonstrated a strong trend towards reducing the number of upper respiratory tract infections (URTIs), reducing symptom days of a cold, and statistically significant changes in the body's response to viral encounters and inflammation.

Study Protocol

| | |
|-------------------|---|
| Study Site | University of Southampton School of Medicine, UK |
| Population | 100 healthy adults (54 men, 46 women) |
| Age | 50-68 (average 59 years) |
| Design | Randomized, double-blinded, placebo-controlled, parallel arm study |
| Duration | 90 days |
| Serving | Participants were split into two groups, and consumed one of the following once daily: <ul style="list-style-type: none">• 250mg Wellmune• placebo |
| Details | Incidence of URTIs was medically confirmed. Blood biomarker evaluation included plasma cytokines and LPS-induced cytokine response. |



"Respiratory infections are a major source of health burden and a leading cause for antibiotic use. The concept of using Wellmune as a nutritional supplement to support immune defenses was very popular with study participants. The results of this pilot are encouraging and further studies certainly seem justified."

—Richard Fuller, M.D., study leader and University of Southampton Hospital Department of Primary Care and Population Science



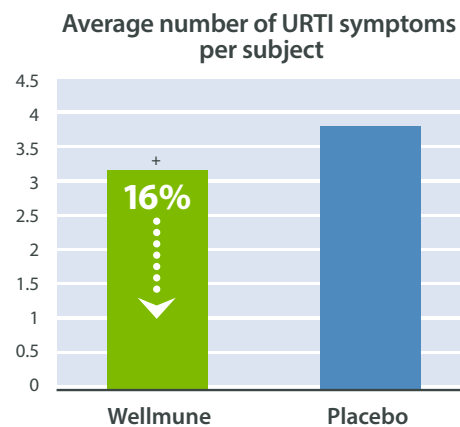
Results

Wellmune modulated the cytokine response to LPS by:

- Increasing levels of a key cell-activating cytokine (interferon-gamma).
- Maintaining levels of key cell-attracting cytokines MCP-1 and MIG.

There was a strong statistical trend that showed Wellmune decreased the number of URTI symptom days.

Participants taking Wellmune had **16% decrease in total URTI symptom days.**



⁺ p=0.067

"Yeast-Derived Beta 1,3/1,6 Glucan, Upper Respiratory Tract Infection and Innate Immunity in Older Adults." (2017) *Nutrition* 39-40:30-35.



Children

Children taking Wellmune[®] are significantly healthier.



Study: Children

Wellmune helped keep children healthier by decreasing episodes of common childhood illnesses and symptoms of illness, such as upper respiratory tract infections (URTIs).

Study Protocol

| | |
|-------------------|---|
| Study Site | Department of Pediatrics, Chang Ping Women and Children Health Care Hospital, PR China |
| Population | 156 healthy children (73 boys, 83 girls) |
| Age | 12-48 months (average 36 months) |
| Design | Randomized, double-blinded, placebo-controlled, parallel arm study |
| Duration | 12 weeks |
| Serving | Participants were split into three groups, and consumed one of the following once daily (beverage based): <ul style="list-style-type: none">• 75mg Wellmune• 35mg Wellmune• placebo |
| Details | <p>All records were medically verified; significant differences between placebo and Wellmune groups were found; no significant differences between the Wellmune groups (35 & 75mg) were found.</p> <p>Investigators observed the health of children after administration of Wellmune or the placebo, recorded total days and times of URTIs, and total days and times of all kinds of infection symptoms.</p> |



Mead Johnson Nutrition has conducted two clinical studies with children in daycare settings. One study demonstrated children consuming a beverage-based formula with Wellmune had significantly fewer acute respiratory infections and the duration of their illnesses were significantly shorter than children drinking unfortified cow's milk. A second study demonstrated fewer episodes of allergy symptoms and other ailments with children drinking the formula with Wellmune.



Children

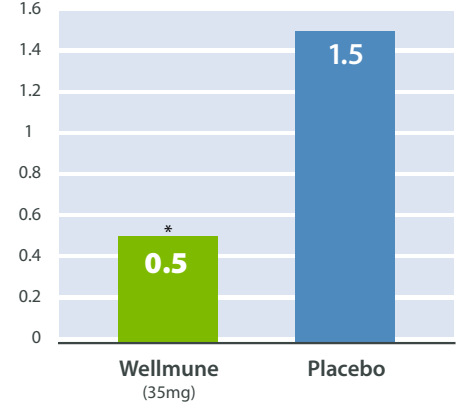


Results

- Children taking Wellmune for 12 weeks reported fewer URTIs and fewer sick days.
- Children taking Wellmune were significantly healthier.

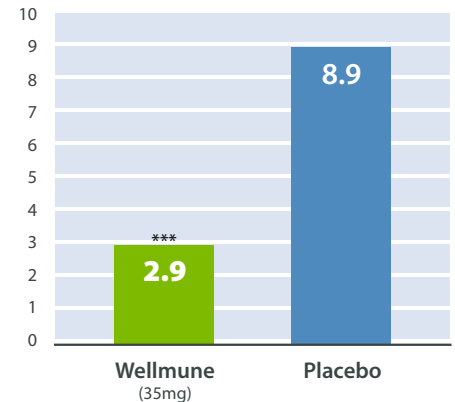
Children taking Wellmune had **2/3 fewer URTIs.**

Average # of URTI incidents per subject



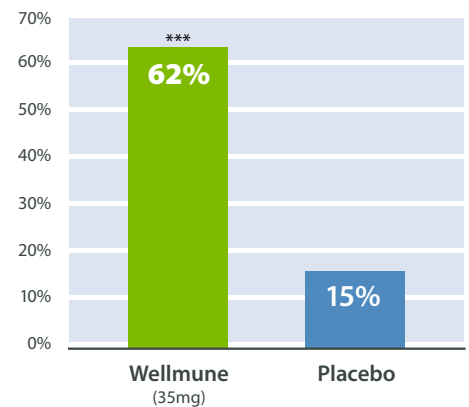
Children taking Wellmune had **6 fewer sick days in 12 weeks.**

Average # of URTI symptom days per subject



Children taking Wellmune were **significantly healthier, with 62% reporting "good" health status.**

% children reporting "good" health status



*p≤0.05, **p≤0.01, ***p≤0.001

"Baker's Yeast Beta-Glucan Decreases Episodes of Common Childhood Illness in 1 to 4 Year Old Children during Cold Season in China." (2016) *Journal of Nutrition & Food Sciences* 6:518.



Athletes

Wellmune® reduces upper respiratory tract infection (URTI) symptoms among marathoners.



Study: Texas Marathon

This study confirmed previous clinical research showing that Wellmune supports the immune system of athletes. In this case, Wellmune showed health benefits for runners who had completed a marathon, for whom post-race URTIs are common.

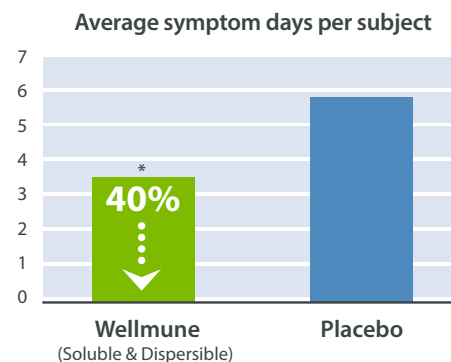
Study Protocol

| | |
|-------------------|--|
| Study Site | Department of Health and Human Performance, University of Houston, USA |
| Population | 182 runners (96 men, 86 women) who completed the 2011 LiveStrong Marathon in Austin, Texas with an average finish time of 4 hours |
| Age | 29-46 (average 34 years) |
| Design | Randomized, double-blinded, placebo-controlled, parallel arm study |
| Duration | Four weeks |
| Serving | Participants were split into three groups, and consumed one of the following once daily: <ul style="list-style-type: none">• 250mg Wellmune soluble• 250mg Wellmune dispersible• placebo |
| Details | Incidence of URTI symptoms was assessed using the clinically-validated WURSS-44 survey. |

Results

- Wellmune supplementation significantly reduced the number of days that subjects reported both general health problems as well as cold/flu symptoms.

Participants taking Wellmune had **40% reduction in URTI symptoms.**



Additional Information

Based on previous studies by the University of Houston, it is reasonable to speculate that the improvements associated with Wellmune were due to alterations in monocytes, plasma cytokines and improved mucosal immunity.



*p≤0.05, **p≤0.01, ***p≤0.001

"Baker's Yeast Beta Glucan Supplementation Increases Salivary IgA and Decreases Cold/Flu Symptomatic Days After Intense Exercise." (2013) *Journal of Dietary Supplements* 10:171-183.



Athletes

Wellmune® supports immune system recovery after strenuous exercise.

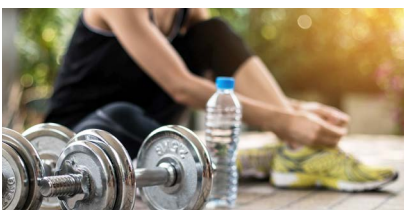
Study: Exercise Stress

Wellmune helps enable both recreational and elite athletes to exercise longer and harder, supporting immune system function after high-intensity exercise.



Study Protocol

| | |
|-------------------|---|
| Study Site | Department of Health and Human Performance, University of Houston, USA |
| Population | 60 recreational athletes (29 men, 31 women) |
| Age | 22-38 (average 23 years) |
| Design | Randomized, double-blinded, placebo-controlled, crossover study |
| Duration | 10 days supplementation with Wellmune or placebo; seven-day wash out period; 10 days supplementation with Wellmune or placebo. |
| Serving | Participants were split into two groups, and consumed the following once daily for 10 days, in two separate instances: <ul style="list-style-type: none">• 250mg Wellmune• placebo |
| Details | After the 10 day supplementation period, participants rode an exercise bicycle for one hour in a heat-stress chamber. Blood and saliva samples were collected on day zero, and immediately before and after the exercise session on day 10. |



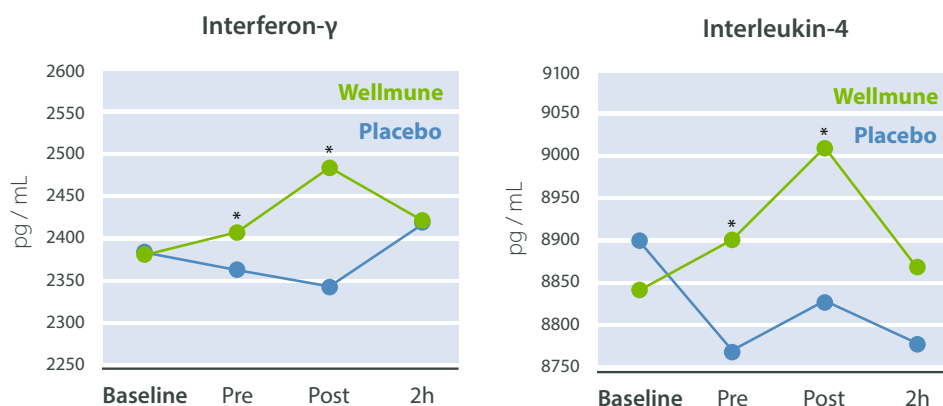
The effectiveness of the immune system drops sharply below its normal state two to six hours after strenuous exercise, gradually recovering within 24 hours.

Results

In this study, Wellmune prevented alterations in monocytes and key cytokines following high-intensity exercise—suggesting that **participants' immune systems better maintained normal function.**

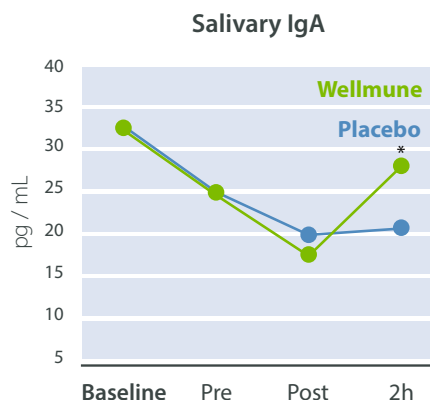
- **Maintained white blood cell levels:** Wellmune prevented the drop in white blood cells that typically occurs following intense exercise.
- **Improved mucosal immunity:** Two hours post-exercise, Wellmune improved salivary IgA recovery by 32% compared to the placebo. IgA, a protective protein, is associated with improved immune protection of the mucosa.
- **Enhanced immune responses to a simulated bacterial challenge:** The Wellmune group had higher levels of key cytokines following lipopolysaccharide (LPS) stimulation suggesting the priming of leukocytes that mediate immune responses.

Wellmune maintained higher levels of LPS-stimulated cytokines.



No effect on IL-1β, IL-6, IL-7, IL-8, IL-10, IL-12p70, IL-13, GM-CSF or TNF-α

Wellmune helped salivary IgA levels rebound more quickly after exercise.



*p≤0.05, **p≤0.01, ***p≤0.001

"Baker's Yeast Beta Glucan Supplementation Increases Salivary IgA and Decreases Cold/Flu Symptomatic Days After Intense Exercise." (2013) *Journal of Dietary Supplements* 10:171-183.

"Baker's Yeast β-glucan Supplementation Increases Monocytes and Cytokines Post-Exercise: Implications for Infection Risk?" (2013) *British Journal of Nutrition* 109:478-486.



General



Wellmune® provides significant relief to ragweed allergy sufferers.

Study: Allergy

Ragweed is a leading cause of seasonal allergy symptoms and affects 36 million Americans, with typical symptoms including nasal congestion, sneezing, itchy eyes and difficulty breathing. This study found that Wellmune reduced allergy symptoms and improved quality of life for ragweed allergy sufferers.

Study Protocol

| | |
|-------------------|---|
| Study Site | GLH Nutrition, Draper UT USA |
| Population | 48 healthy volunteers (31 female, 17 male) |
| Age | 18-53 (average 39 years) |
| Design | Randomized, double-blinded, placebo-controlled, parallel arm study |
| Duration | Four weeks |
| Serving | Participants were split into two groups, and consumed one of the following once daily: <ul style="list-style-type: none">• 250mg Wellmune• placebo |
| Details | Allergy surveys, including the validated Rhinoconjunctivitis Quality of Life Questionnaire (RQLQ), were used to assess allergy symptoms and overall quality of life. |

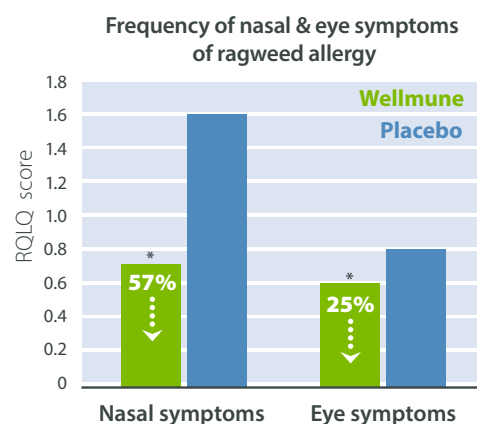


Results

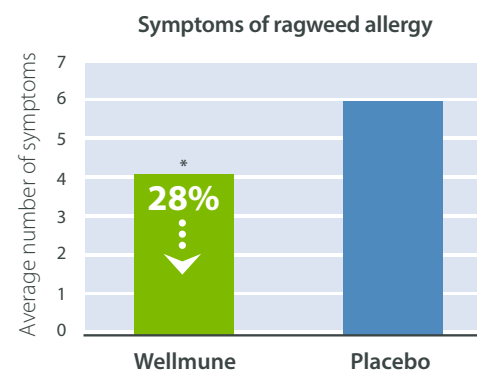
Participants taking Wellmune for four weeks reported:

- 56% improvement on the Quality of Life Index.
- Significant reduction in average allergy symptoms and key nasal- and eye-related symptoms.

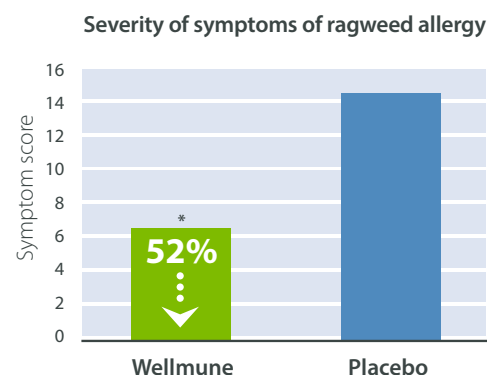
Participants taking Wellmune had **57% reduction in nasal symptoms** and **25% reduction in eye symptoms.**



Participants taking Wellmune had **28% reduction in average number of allergy symptoms.**



Participants taking Wellmune had **52% reduction in severity of allergy symptoms.**



*p≤0.05, **p≤0.01, ***p≤0.001

"B-Glucan Supplementation, Allergy Symptoms and Quality of Life in Self-Described Ragweed Allergy Sufferers." (2013) *Food Science & Nutrition* 1:90-101.



Stress

Wellmune® reduces duration of cold/flu symptoms for highly stressed adults.



Study: Medical Students

Lifestyle stress has been shown to suppress the immune system, putting otherwise healthy individuals at risk—especially during cold-and-flu season. In this study, Wellmune demonstrated a strong trend towards reducing the duration of upper respiratory tract infection (URTI) symptoms for medical students.

Study Protocol

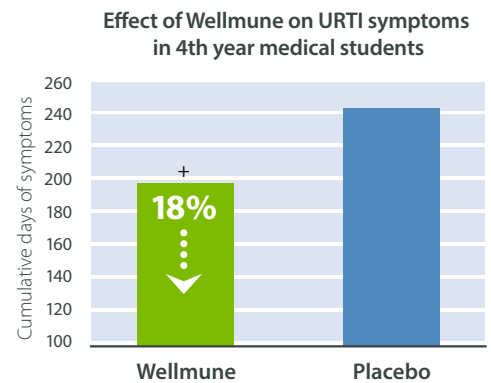
| | |
|-------------------|---|
| Study Site | University of Southampton School of Medicine, UK |
| Population | 97 fourth-year medical school students |
| Age | 18-65 (average 21 years) |
| Design | Randomized, double-blinded, placebo-controlled, parallel arm study |
| Duration | 90 days |
| Serving | Participants were split into two groups, and consumed one of the following once daily: <ul style="list-style-type: none">• 250mg Wellmune• placebo |
| Details | <p>Participants completed a daily health diary recording presence or absence of URTI symptoms. Two or more reported symptoms for two consecutive days triggered a medical assessment and cytokine analysis within 24 hours.</p> <p>24 episodes of URTIs were medically confirmed; 12 in each group.</p> |



Results

- Participants taking Wellmune experienced a significant reduction in URTI symptoms.
- Wellmune did not stimulate the immune system with inflammatory cytokines when subjects were not experiencing a URTI.

Participants taking Wellmune had **18% reduction in the total days with URTI symptoms.**



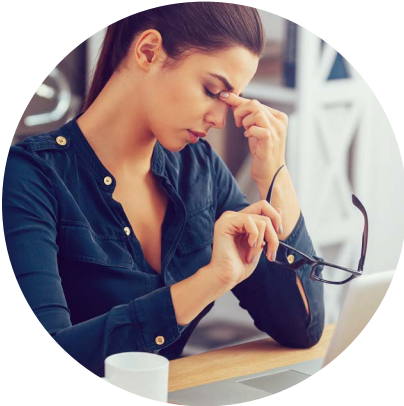
+p=0.06

"Influence of Yeast-Derived 1,3/1,6 Glucopolysaccharide on Circulating Cytokines and Chemokines with Respect to Upper Respiratory Tract Infections." (2012) *Nutrition* 28:665-669.



Stress

Wellmune® reduces upper respiratory tract infection (URTI) symptoms and improves mood state for moderately stressed women.



Study: Lifestyle Stress, 12 Weeks

This study's results were consistent with data from other studies demonstrating that Wellmune can support immune responses during periods of both physical and psychological stress.

Study Protocol

| | |
|-------------------|---|
| Study Site | SupplementWatch, Draper, UT USA |
| Population | 77 healthy female volunteers |
| Age | 18-65 (average 41 years) |
| Design | Randomized, double-blinded, placebo-controlled, parallel arm study |
| Duration | 12 weeks |
| Serving | Participants were split into two groups, and consumed one of the following once daily: <ul style="list-style-type: none">• 250mg Wellmune• placebo |
| Details | Changes in mental and physical energy levels and overall well-being were measured using the clinically-validated Profile of Mood States (POMS) psychological survey. |

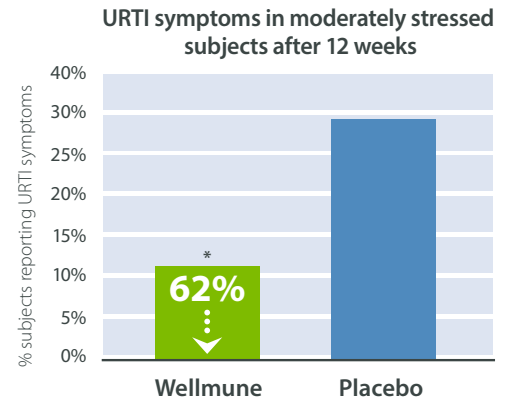


Results

Participants taking Wellmune for 12 weeks reported:

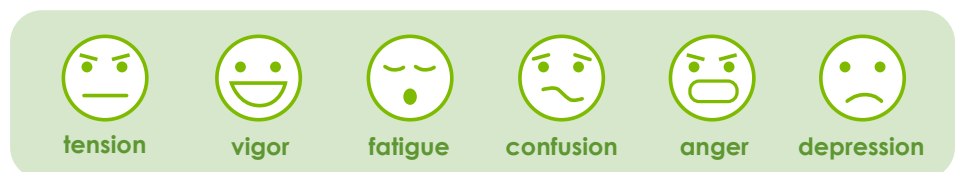
- A significant decrease in URTI symptoms.
- An 8.3% improvement in overall well-being and 26% increase in vigor.

Participants taking Wellmune had
62% reduction in URTI symptoms.



Additional Information

The Profile of Mood States (POMS) Survey Instrument is clinically validated and employs 65 adjective-based indicators of mood scaled for intensity (0-4); specific combinations of the adjectives define the 6 mood state factors:



*p<0.05, **p<0.01, ***p<0.001

"Baker's Yeast Beta-Glucan Supplement Reduces Upper Respiratory Symptoms and Improves Mood State in Stressed Women." (2012) *Journal of the American College of Nutrition* 31:295-300.



Stress

Wellmune® significantly improves mood state and reduces upper respiratory tract infection (URTI) symptoms for stressed adults.



Study: Lifestyle Stress, 4 Weeks

Stress can negatively affect immune function—and thus health—in a variety of ways. This study found a marked improvement in general health of stressed individuals in reduction of amount and duration of URTIs and improvement in general well-being.

Study Protocol

| | |
|-------------------|--|
| Study Site | GLH Nutrition, Draper UT USA |
| Population | 150 healthy volunteers (45 men, 105 women) |
| Age | 18-65 (average 37 years) |
| Design | Randomized, double-blinded, placebo-controlled, parallel arm study |
| Duration | Four weeks |
| Serving | Participants were split into three groups, and consumed one of the following once daily: <ul style="list-style-type: none">• 250mg Wellmune• 500mg Wellmune• placebo |
| Details | <p>Subjects maintained a daily health log to track the occurrence and duration of URTI symptoms (cough, sore throat, sneezing, etc.) Subjects also periodically completed a questionnaire on overall health.</p> <p>Changes in mental and physical energy levels and overall well-being were measured using the clinically-validated Profile of Mood States (POMS) psychological survey.</p> |

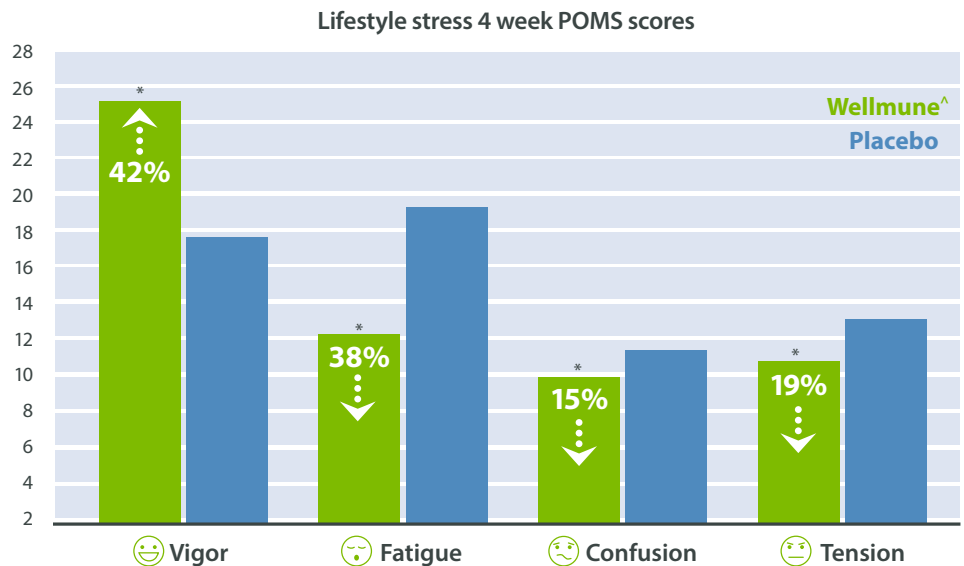
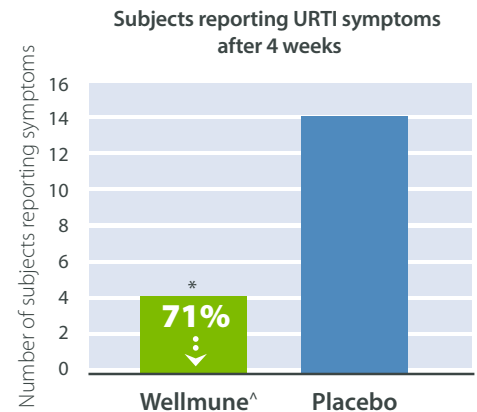


Results

Participants taking Wellmune for four weeks reported:

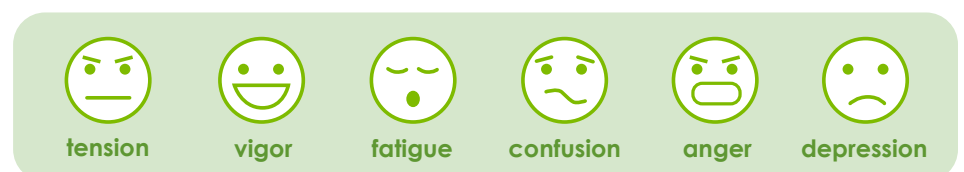
- A significant decrease in reported URTIs.
- Decreases in fatigue, confusion and stress, and an increase in vigor.

In the Wellmune group there was a **71% reduction in number of individuals reporting URTI symptoms.**



About the POMS

The Profile of Mood States (POMS) Survey Instrument is clinically validated and employs 65 adjective-based indicators of mood scaled for intensity (0-4); specific combinations of the adjectives define the 6 mood state factors:



*p≤0.05, **p≤0.01, ***p≤0.001

[^]250mg Wellmune group only (500mg Wellmune group not included in data set)

"Beta 1,3/1,6 Glucan Decreases Upper Respiratory Tract Infection Symptoms and Improves Psychological Well-being in Moderate to Highly-Stressed Subjects." (2010) Agro FOOD Industry Hi-Tech 21:21-24.



Athletes



Wellmune® improves health in marathoners.

Study: California Marathon

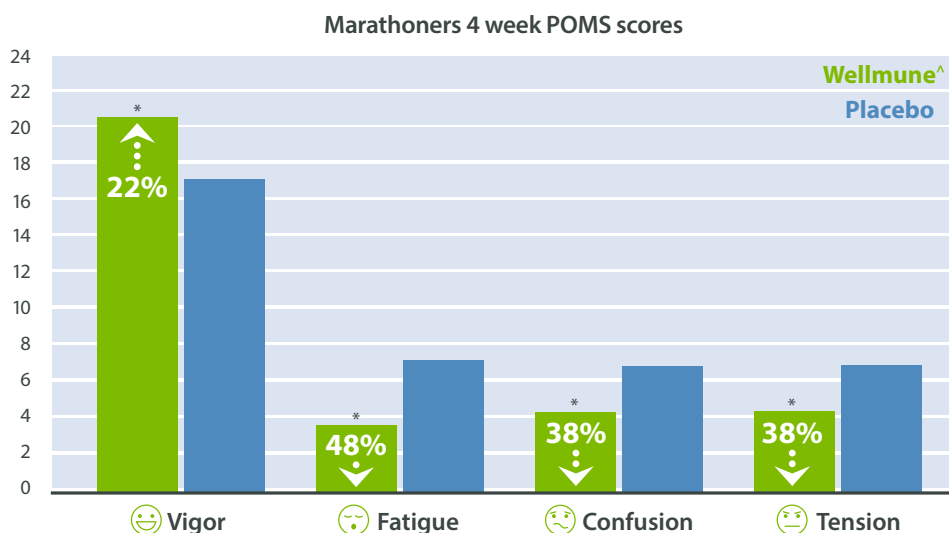
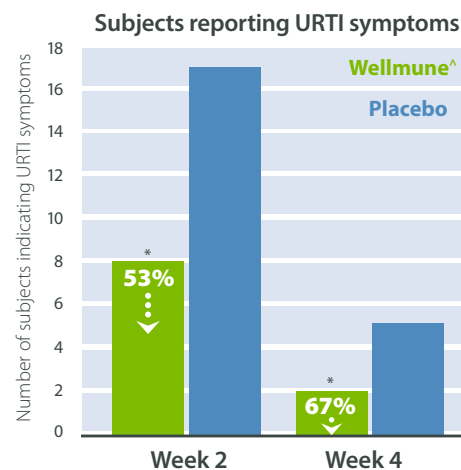
Wellmune increased vigor and mental clarity, while reducing fatigue, tension, confusion and upper respiratory tract infection (URTI) symptoms in marathon runners.

Study Protocol

| | |
|-------------------|--|
| Study Site | GLH Nutrition, Draper UT USA |
| Population | 75 marathon runners (35 men, 40 women) recruited at the 2007 Carlsbad Marathon in California |
| Age | 18-53 (average 36 years) |
| Design | Randomized, double-blinded, placebo-controlled, parallel arm study |
| Duration | Four weeks |
| Serving | Participants were split into three groups, and consumed one of the following once daily: <ul style="list-style-type: none">• 250mg Wellmune• 500mg Wellmune• placebo |
| Details | <p>Subjects maintained a daily health log to track the occurrence and duration of URTI symptoms (cough, sore throat, sneezing, etc.) Subjects also periodically completed a questionnaire on overall health.</p> <p>Changes in mental and physical energy levels and overall well-being were measured using the clinically-validated Profile of Mood States (POMS) psychological survey.</p> |

Results

Participants taking Wellmune had
53% reduction in number of individuals reporting URTI symptoms after 2 weeks.
 and
67% reduction in number of individuals reporting URTI symptoms after 4 weeks.



About the POMS

The Profile of Mood States (POMS) Survey Instrument is clinically validated and employs 65 adjective-based indicators of mood scaled for intensity (0-4); specific combinations of the adjectives define the 6 mood state factors:



*p<0.05, **p<0.01, ***p<0.001

[^]250mg Wellmune group only (500mg Wellmune group not included in data set)

"Effect of Beta 1,3/1,6 Glucan on Upper Respiratory Tract Infection Symptoms and Mood State in Marathon Athletes." (2009) *Journal of Sports Science and Medicine* 8:509-515.



General



Wellmune® maintains and enhances general health, reducing downtime.

Study: Cold/Flu

In a cold and flu season study, Wellmune eliminated the need to miss work or school due to cold/flu-like symptoms. Participants also reported an increase in general health markers, including physical energy and emotional well-being.

Study Protocol

| | |
|------------|---|
| Study Site | Miami Research Associates, South Miami, FL USA |
| Population | 40 healthy subjects (12 men, 28 women) |
| Age | 18-60 (average 33 years) |
| Design | Randomized, double-blinded, placebo-controlled, parallel arm study |
| Duration | 12 weeks |
| Serving | Participants were split into two groups, and consumed one of the following once daily: <ul style="list-style-type: none">• 500mg Wellmune• placebo |
| Details | Cold/flu symptoms were evaluated by medical staff within 24 hours of onset. |

Results

Participants taking Wellmune for 12 weeks reported:

- **No missed work or school due to colds**, compared with 1.38 days of work/school missed for the placebo group.*
- **An increase in quality of life**, including physical energy and emotional well-being, as measured by a clinically validated health survey questionnaire (SF-36v-2).*
- **No adverse events** were detected and no safety concerns were present.

While there were no significant differences in the incidence of symptomatic respiratory infections among the study groups, the duration and severity of the symptoms were alleviated in subjects receiving Wellmune.

*p≤0.05, **p≤0.01, ***p≤0.001

"Randomized Phase II Clinical Trials of Wellmune® for Immune Support During Cold and Flu Season." (2009) *Journal of Applied Research* 9:30-42.



Stress



Firefighters report improved health with Wellmune®.

Study: Firefighters

Wellmune reduced upper respiratory tract infection (URTI) symptoms and improved overall physical health during this two-week trial with Montana's Wildland Firefighters, who serve their communities by fighting seasonal wilderness fires, typically May through October.

Study Protocol

| | |
|-------------------|--|
| Study Site | University of Montana, USA |
| Population | 54 Firefighters |
| Age | 18-65 (average 26 years) |
| Design | Single-blind, randomized cross-over study design. |
| Duration | 14 days supplementation with Wellmune or placebo; three-day washout period; 14 days supplementation with Wellmune or placebo. |
| Serving | Participants were split into two groups, and consumed one of the following once daily: <ul style="list-style-type: none">• 250mg Wellmune• placebo |
| Details | <p>Subjects completed a daily health questionnaire as used by Nieman et al. (2002), with additional questions added that pertained specifically to the supplement.</p> <p>An individual was classified as having a URTI when he or she recorded a cold or flu symptom for a minimum of two consecutive days.</p> <p>At the conclusion of each trial arm, subjects completed an overall health performance questionnaire, which contained questions regarding the subject's overall health during the 14-day trial.</p> |

Results

Participants taking 250mg of Wellmune for four weeks reported:

- 23% reduction in URTI symptoms.⁺

⁺p=0.06

"Effects of an Immunomodulating Supplement on Upper Respiratory Tract Infection Symptoms in Wildland Firefighters." (2008) *Medicine & Science in Sports & Exercise* 40:S353.

Research Bibliography

Research supporting the safety and efficacy around Wellmune is the subject of numerous peer-reviewed journal articles and presentations at scientific forums as outlined below.

Clinical Research



Mah E, Kaden VN, Kelley KM, Liska DJ. (2019) Soluble and Insoluble Yeast B-Glucan Differentially Affect Upper Respiratory Tract Infection in Marathon Runners: A Double-Blind, Randomized Placebo-Controlled Trial. [published online ahead of print 2019 Oct1] *Journal of Medicinal Food*. 2019;10.1089/jmf.2019.0076.



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Children



Older Adults



Athletes



Stress



General



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Talbott SM, Talbott JA. (2012) Baker's Yeast Beta-Glucan Supplement Reduces Upper Respiratory Symptoms and Improves Mood State in Stressed Women. *Journal of the American College of Nutrition* 31:295-300.



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Wellmune has been the focus of high-profile pre-clinical studies. The April 2011 issue of the journal **Nature** depicts Wellmune that has been engulfed by a macrophage.

Preclinical Research

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Children



Older Adults



Athletes



Stress



General

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Tsikitis VL, Albina JE, Reichner JS. (2004) Beta-Glucan Affects Leukocyte Navigation in a Complex Chemotactic Gradient. *Surgery* 136:384-389.

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Analytical Research

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Contact us.

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