Pulmonary Revive™

Supports Respiratory Health

O designs for health[®]

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Pulmonary Revive[™] formulation incorporates a highly potent botanical, mushroom, and nutrient blend to support lung function.* The herbs and mushrooms in this formula support a healthy immune response and normal inflammatory response to help address some of the factors that participate in the pathophysiology of inflammatory lung diseases.*

Ingredient Highlights

- Full-spectrum blend of cordyceps mushrooms
- Ginger standardized to contain 5% gingerols
- Boswellia extract standardized to contain 70% boswellic acid
- 600 mg N-acetyl-cysteine to support antioxidant status

Cordyceps Full-Spectrum Blend (featuring *C. militaris* **and** *C. sinensis* — whole mushrooms): Cordyceps mushrooms have a long history of medicinal uses, especially in traditional Chinese medicine. Of the hundreds of species in the cordyceps family, the two featured in Pulmonary ReviveTM (*C. militaris* and *C. sinensis*) have the most supporting data. Cordyceps mushrooms contain several bioactive compounds, the main of which is cordycepin, an analog of adenosine.¹⁻³

Many respiratory diseases, including asthma, COPD, acute respiratory distress syndrome, and cystic fibrosis involve pulmonary inflammation, although the underlying mechanisms may differ based on the condition.⁴ Animal studies have demonstrated the potential for cordyceps mushrooms to exert anti-inflammatory effects by inhibiting tumor necrosis factor-alpha (TNF- α), interleukin (IL)-8, IL-1 β , transforming growth factor-beta1 (TGF- β 1), nuclear factor kappa B (NF- κ B) activation, and cyclooxygenase (COX)-2 and inducible nitric oxide synthase (iNOS) expression. Studies have also found cordyceps reduced neutrophil infiltration and activated nuclear factor erythroid 2-related factor (Nrf2) signaling pathway. In animal models, these anti-inflammatory and antioxidant effects supported the attenuation of airway modeling and prevented damage to lung tissue.⁵⁻⁷ Animal studies have also illustrated the potential for cordyceps to benefit allergic rhinitis and asthma through alleviating immune hypersensitivity

Benefits*

- Supports healthy lung function
- Supports normal immune function
- Supports a healthy inflammatory response
- May help support individuals with respiratory allergies

Supplement Facts

Serving Size 4 capsules Servings Per Container 30

Amount Per Serving	%	Daily Value
Cordyceps Full Spectrum Blend (<i>Cordyceps militaris</i> and <i>Cordyceps sinensis</i>) (whole mushroom)	700 mg) *
N-Acetyl-Cysteine	600 mg	*
Boswellia Extract (<i>Boswellia serrate</i>)(resin) [standardized to contain 70% boswellic acid]	400 mg) *
Bromelain (Ananas comosus)(stem)	400 mg	*
Ginger (<i>Zingiber officionale</i>)(rhizome) [standardized to contain 5% gingerols]	400 mg	*
*Daily Value not established.		

Other Ingredients: Cellulose (capsule), dicalcium phosphate, vegetable stearate, silicon dioxide.

and airway hyperreactivity reactions.⁸⁻¹⁰ A cell study on human bronchial epithelial tissue found that cordyceps inhibited cigarette smoke-induced senescence by blocking the reactive oxygen species (ROS) and phosphatidylinositol 3-kinase/protein kinase B/mammalian target of the rapamycin (PI3K/AKT/mTOR) signaling pathway.¹¹

Clinical studies support the potential for cordyceps to benefit inflammatory lung diseases. In a randomized controlled trial, patients with moderate-to-severe asthma took either *C. sinensis* or a placebo for 12 weeks as an adjunct to their standard treatment. There was a significant increase in lung function and quality of life, and a reduction of inflammatory markers in the treatment group compared to the control.¹² A systematic review and meta-analysis on *C. sinensis* for patients with COPD found potential benefits for improved symptoms, lung function, and quality of life.¹³ Clinical studies have also found cordyceps to demonstrate immune-modulatory effects, including the enhancement of cell-mediated immunity in healthy adults.^{14,15}

N-Acetyl-Cysteine (NAC) has antioxidant properties that scavenge free radicals with a long history of use to support lung function in acute and chronic respiratory conditions.^{*16} In addition to its own antioxidant properties, it acts as a precursor to the primary intracellular antioxidant, glutathione. Increasing antioxidant status may support a healthy redox balance to reduce the potential for oxidative stress and associated damage to the lungs. Additionally, NAC affects inflammatory signaling pathways, and as such, may promote anti-inflammatory effects.¹⁷⁻²⁰ In one mouse model of allergic asthma, depleting glutathione levels during both the sensitization and challenge phases led to a worsening of allergen-induced airway reactivity inflammation and increasing oxidative stress. NAC supplementation repleted the glutathione pool and counteracted the inflammation and also restored oxidative balance.²¹

NAC also acts as a mucolytic agent helping to thin mucous secretions. The free thiol group depolymerizes and degrades mucin by hydrolyzing the disulfide bonds that link the mucin monomers, thereby decreasing the viscosity of sputum. Its role as an antioxidant can also positively influence sputum production, as oxidative stress and inflammation may increase mucus secretion.²²

Clinical trials of participants with COPD found that NAC supplementation significantly improved small airway function and reduced its frequency, time in between episodes, and probability of exacerbation.^{23,24} Meta-analyses also found that long-term NAC supplementation reduced the risk of COPD and chronic bronchitis symptoms and exacerbation.²⁵⁻²⁷

Bromelain (Ananas comosus) is a proteolytic enzyme derived from pineapple that possesses potent anti-inflammatory and immunoregulatory properties to support lung function.* It helps reduce the synthesis of prostaglandin E2 and COX-2 and may also downregulate iNOS and suppress NF-kB to promote a healthy response to inflammation. Bromelain also has mucolytic properties.²⁸⁻³⁰ Additionally, it has been shown to help regulate the inflammatory response triggered by cellular stress in immune cells. Bromelain also modulates the surface adhesion molecules on immune cells, including degrading CD44, which activates lymphocytes and the dendric cell activation of T cells by 80% to 90%.^{29,31-33}

Animal model studies have demonstrated that bromelain supplementation may help reduce allergic symptoms and allergic airway disease, limit airway inflammation, and reduce histological damage to lung tissue, which is likely due to its modulation of dendric cells and anti-inflammatory and anti-allergic properties.^{31,34,35}

Boswellia Extract (Boswellia serrate, also known as Indian frankincense) is an Ayurvedic plant that contains triterpenoids called boswellic acids, which have potent anti-inflammatory properties. These compounds reduce inflammation by inhibiting 5-lipoxygenase (5-LOX), proteases, the complement system, COX-2, and NF-κB. Additionally, boswellic acids have been found to reduce overexpression of TNF-α, other proinflammatory cytokines, and matrix metalloproteinases (MMP). In mouse models of asthma, Boswellia supplementation reduced airway inflammation and decreased T helper 2 (Th2) cytokines by inhibiting phosphorylation of the signal transducer and activator of transcription-6 (STAT6) and the expression of GATA-binding protein 3 (GATA-3).³⁶⁻⁴⁰ In one randomized, controlled clinical study, patients with asthma who used a Boswellia supplement as adjunct therapy experienced a reduced need for inhalation therapy compared to the control group.³⁶

Ginger (Zingiber officionale) has well-known anti-inflammatory properties that help suppress prostaglandin synthesis through the inhibition of COX-1 and COX-2, and it suppresses leukotriene biosynthesis by inhibiting 5-lipoxygenase (5-LOX). Additionally, ginger has been shown to decrease prostaglandin E2 production, TNF-α, IL-5, and monocyte chemoattractant protein-1 (MCP-1), and it affects immune cell activation and migration. Additionally, ginger has antioxidant properties in reducing NF-κB activation and inhibiting ROS levels and iNOS expression.⁴¹⁻⁴³ Studies have also shown that ginger supplementation benefits inflammatory and oxidative stress markers, including C-reactive protein (CRP), TNF-α, IL-6, prostaglandin E3 (PGE3), total antioxidant capacity, and malondialdehyde (MDA).^{44,45} These anti-inflammatory properties have been found to benefit human bronchial epithelial cells, which may provide benefit for respiratory conditions associated with inflammation.⁴⁶

Studies using animal models of asthma have found that ginger reduces lung inflammation and protects the lungs from damage by limiting NF- κ B signaling and production of proinflammatory cytokines in CD4 cells and suppressing Th-2 mediated immune responses and upregulating the adenosine monophosphate-activated protein kinase (AMPK)/Nrf2/Heme oxygenase-1 (HO-1) signaling pathway.⁴⁷⁻⁵⁰ In a case control study in patients with allergic asthma, ginger extract reduced the expression of the main cells involved in the symptoms of asthma, including GATA-3, ROR- γ T, and T-bet (transcription factors for Th2, Th17, and Th1 cells, respectively). Ginger supplementation also led to beneficial changes to the Th1/Th2 ratios for a more normal balance between Th1, Th2, and Th17.⁵¹

Recommended Use: Take 2 capsules twice a day or as directed by your health-care practitioner.

For a list of references cited in this document, please visit: http://www.designsforhealth.com/techsheet-references/pulmonary-revive-references.pdf

*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.

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