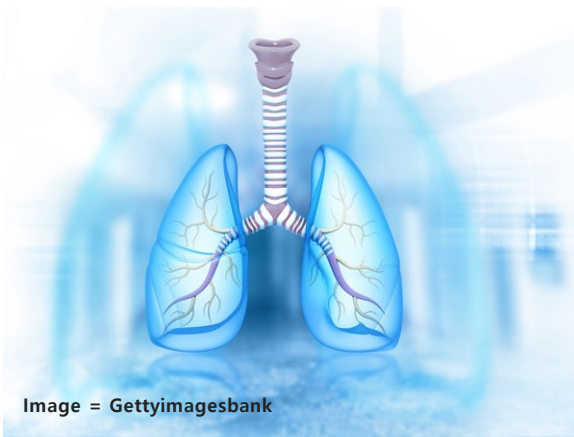


BenBreath

- Functional food ingredients for respiratory health
- A complex of guava leaf and other extracts

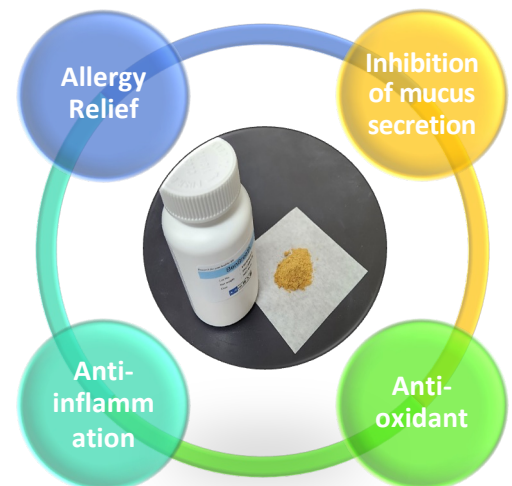


Respiratory health

- Interest in respiratory health is continuously increasing due to changes in environmental factors such as air pollution and particulates.
- Chronic obstructive pulmonary disease (COPD) is not only the third leading cause of death worldwide, but the prevalence of respiratory diseases such as asthma and COPD continues to increase, so maintaining and managing respiratory health is very important.

Functional food ingredient for respiratory health

- BenBreath, a natural complex, is made of 100% plant-derived food ingredients and can be safely consumed for a long period of time.
- For those who cannot sleep comfortably due to coughing and phlegm, we are developing products with excellent efficacy and effectiveness that can surely improve symptoms.



Efficacy evaluation according to health functional food (respiratory health) development guidelines

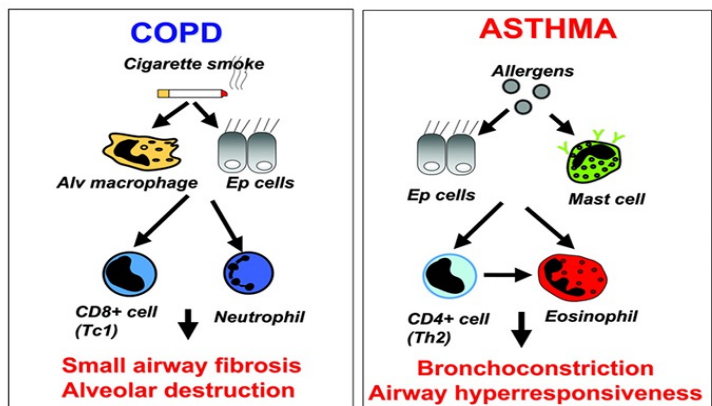
| | | Biomarker | Types of measurable research | | |
|--|---|--|------------------------------|---------|-------|
| | | | in vitro | in vivo | Human |
| Markers of inflammation | Improvement of allergic inflammation in the bronchus | Immune cells: Total inflammatory cell , leukocyte, eosinophil, mast cell, T cell, B cell, Th2, Th1/Th2 ratio | ○ | ○ | ○ |
| | | Immune substance: IL-1β, IL-4, IL-5, IL-6, IL-13, IL-17, IL-23, TNF-α , IgE, Leukotriene, Eotaxin | ○ | ○ | ○ |
| | Improvement of chronic inflammation | Mechanism: NF-κB (IK-B, p50, p65, etc.) pathway, MAPK (ERK, p38, JNK, etc.) pathway, PTEN/PI3K/AKT pathway, STAT6 | ○ | ○ | |
| | | Immune cells: Total inflammatory cell , leukocyte, neutrophil, monocyte, alveolar macrophage, CD4 ⁺ T cell, CD8 ⁺ T cell, Th1, Th17 | | ○ | ○ |
| | | Immune substance: TNF-α , TGF-β, IFN-γ, IL-1β, IL-6, IL-8, IgG, CXCL-1, CXCL2(MIP-2) | ○ | ○ | ○ |
| | Improvement of endobronchial antioxidant capacity | Related enzymes: iNOS, COX-2 | ○ | | |
| Mechanism: NF-κB (IK-B, p50, p65, etc.) pathway, MAPK (ERK, p38, JNK, etc.) pathway, PTEN/PI3K/AKT pathway | | ○ | ○ | | |
| | Antioxidant Enzyme Activity (GPx, GSH, SOD, catalase, etc.) | ○ | ○ | ○ | |
| | Peroxide concentration (ROS, 8-isoprostane, H ₂ O ₂ , NO, etc.) | ○ | ○ | ○ | |

| | | Biomarker | Types of measurable research | | |
|----------------------|--|---|------------------------------|---------|-------|
| | | | in vitro | in vivo | Human |
| Pathological markers | Improvement of alveolar structure | Mean number of alveoli | | ○ | |
| | | Mean Linear Intercept | | ○ | |
| | | Lung mucosal epithelial permeability | | ○ | |
| | | Matrix metalloproteinases(MMPs: MMP1, MMP2, MMP8, MMP-9 , MMP-12) activity, neutrophil elastase(NE) activity, Protease/anti-protease ratio | ○ | ○ | ○ |
| | Improvement in muscle contraction | Lung cell damage: Apoptosis pathway (Bcl-2, Bax, caspases, etc.) | ○ | ○ | |
| | | Lung cross-sectional luminal area | | ○ | |
| | | Degree of airway smooth muscle contraction | | ○ | |
| | Improvement of tissue fibrosis | Lung tissue infiltration | | ○ | |
| | | Airway hyperresponsiveness measurement | | ○ | |
| | | Bronchial Thickness | | ○ | |
| | Improvement of mucous hypersecretion | Smooth muscle thickness (quantification of collagen) | ○ | ○ | |
| | | Fibrosis related mechanism: TGF-β1/Smad signaling(p-Smad2, p-Smad3) | ○ | ○ | |
| | Hyperproliferation of mucous secreting cells, number of goblet cells | ○ | ○ | | |
| | Amount of mucin production , expectorant activity | | ○ | ○ | |
| | MUC5AC, MUC5B, MUC2 | ○ | ○ | | |

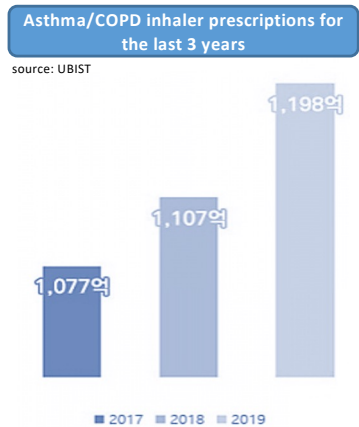
※ Items in red text have been evaluated for efficacy.



Health Information for Respiratory Diseases



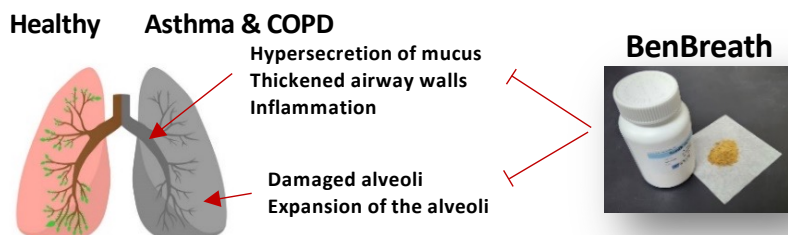
Barnes, Peter J. *Pharmacological reviews* 56.4 (2004): 515-548.



※ Health information is not related to product information.

Causes and symptoms of respiratory diseases

- ✓ Asthma is mainly caused by allergic reactions to triggers such as exposure to allergens, viral infections, occupational irritants, and dietary habits.
- ✓ COPD is caused by marked narrowing of the airways due to prolonged smoking, exposure to harmful gases at work, indoor and outdoor air pollution, and lung infection-induced chronic inflammatory response of the bronchi and lung parenchyma.
- ✓ Both diseases have common symptoms such as cough, chronic phlegm, and shortness of breath.
- ✓ In general, with age, and the drier and colder the weather, the symptoms get worse.



Reasons for the development of BenBreath

- ✓ Those who suffer from coughing at the change of seasons.
- ✓ Those who are concerned about their health due to smoking and particulates.
- ✓ Those who work in poorly ventilated areas.
- ✓ Those who use the neck a lot.
- ✓ Those who want to sleep soundly without being disturbed by coughing at night.
- ✓ Those who have coughing and shortness of breath even after going up the stairs a little.

Development stage of BenBreath (as of December 2022)

