

BerriQi® for Respiratory Immune Balance

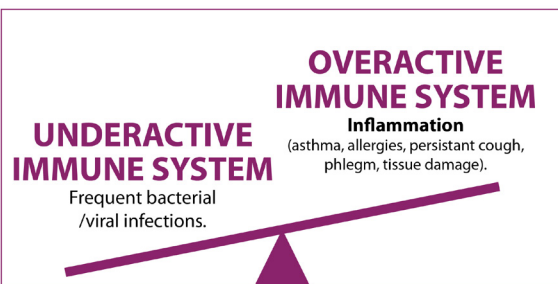
The global immune health supplements market size was valued at USD 55.3 billion in 2020 and is expected to expand at a compound annual growth rate (CAGR) of 11.3% from 2021 to 2028. Driving forces behind the growth include the increasing prevalence of infectious diseases, and increased severity and duration of disease.

An uncomplicated viral or bacterial infection will last from three to seven days in most people, including children. However, lingering cough and feelings of weakness or fatigue can last for two weeks to three months. Increased phlegm from mucus over-production in both the lungs and sinuses can lead to lingering coughs. Continued coughing is irritating to the lungs, causing further immune cell infiltration, blocking the airways, leading to a wheeze sound and strained breathing.

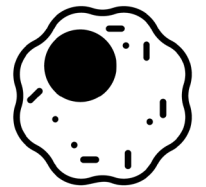
BerriQi contains high levels of unique anthocyanins that work with the lung's natural immune system to re-establish respiratory immune balance and resolve lingering symptoms.^{1,2}

What is respiratory immune balance?

Respiratory immune balance is the ability of the airways and lungs to return to a normal healthy state quickly and completely after inflammation. Inflammation is the natural process of neutralising and removing dangerous foreign particles and pathogens. Immune balance relies on checkpoints in specific immune cells that recruit and activate other immune cells to fight when needed; reduce these immune cell numbers when finished; and reorient immune cell activity to heal and repair damaged tissue after the threat has been removed.



What are macrophages and why are they so important?

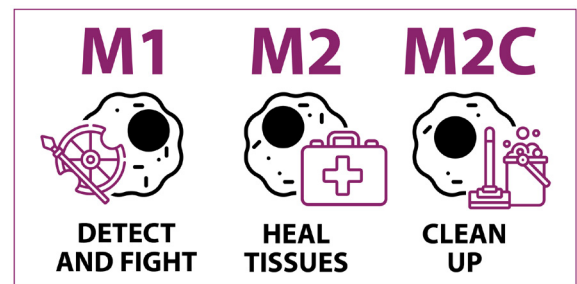


Macrophage

Macrophages are innate immune cells that may reside in both the epithelial cells of lungs (alveolar macrophages) and circulate in the blood as a type of white blood cell. Macrophages play multiple important roles in detecting and fighting pathogens and healing damaged tissue. Macrophage activity can change based on environmental cues. The three main macrophage activation states are:

- M1 activated macrophages detect and fight pathogens while recruiting other immune cells to help
- M2 activated macrophages heal tissue that was damaged by the pathogen or collaterally damaged by immune cell activity by prompting epithelial cells to produce collagen like a bandage
- M2C activated macrophages clean up any mess left behind from healing, such as removing collagen that is no longer needed.

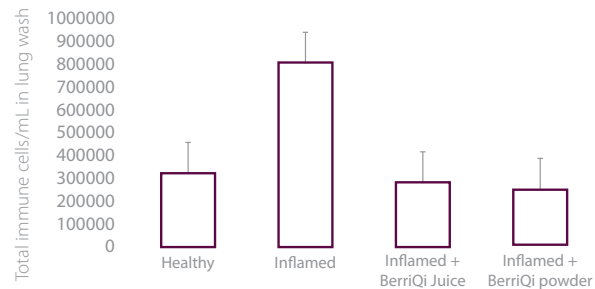
This ability of macrophages to change states to perform multiple different functions places them at the centre of immune balance. Because macrophage activity can be influenced by environmental factors, including diet, they are also a convenient target for interventions such as BerriQi, to help re-establish balance.



Lung inflammation^{1,2}

The respiratory immune system reacts to environmental stressors by producing molecules such as macrophages, neutrophils, eosinophils, and antigen presenting cells. These cells are similar in that they typically engulf a bacteria, virus, or allergen, and then neutralise the invader. Some of these immune cells present pieces of the foreign invader to the rest of these immune system so as to develop adaptive immunity and prevent future infections. One of the challenges of these immune cells is that they are very effective at recruiting help. This influx of immune cells into the lungs is an excellent measure of lung inflammation but feels very uncomfortable to the person attempting to breathe.

BerriQi consumption restores the total number of immune cells in the lungs to normal pre-inflammatory levels.



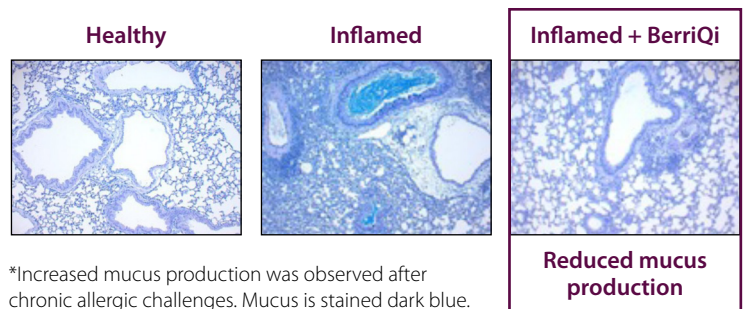
BerriQi consumption restores the number of Antigen Presenting Cells and Eosinophils to normal pre-inflammatory levels.

The unique anthocyanins in BerriQi prevent proinflammatory transcription factor NfκB from translocating to the nucleus of lung cells, while promoting anti-inflammatory PPARγ translocation.

Mucus over-production^{1,2}

The immune cells that have effectively done their job neutralising respiratory invaders need to be removed. The lungs contain goblet cells which produce mucus. In normal conditions this mucus serves the important purpose of lubricating the lungs. During an infection, extra mucus is produced to carry the spent immune cells and foreign invaders out of the lungs, making room for air to enter. This extra mucus production can be problematic if it continues beyond the infection.

BerriQi reduces the accumulation of mucus positive cells in chronically inflamed lungs. Mucus is shown in dark blue staining.



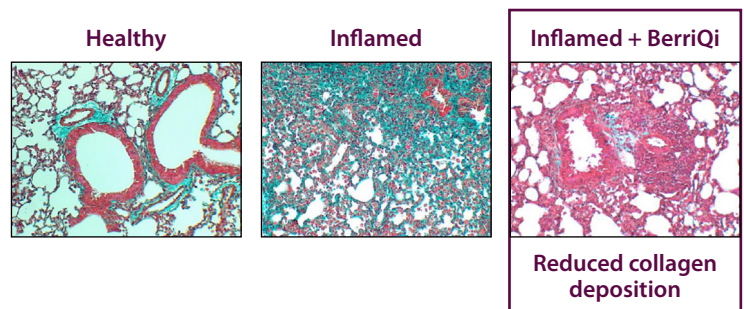
*Increased mucus production was observed after chronic allergic challenges. Mucus is stained dark blue.

Airway remodelling and scarring^{1,2}

When the respiratory immune system remains activated for too long, macrophages prompt the fragile lining of the lungs to produce collagen. Collagen can provide structural support in the short term, but becomes stiff scar tissue when left too long, in a process called airway remodelling. Airway remodelling leads to reduced lung capacity, shortness of breath, and wheezing.

BerriQi assisted in the repair of damaged lung tissue by reducing collagen deposition (scarring) in the lung.

At the high dose, BerriQi reverses scarring in the lungs by removing collagen that has been deposited under chronic inflammatory conditions. The unique anthocyanins in BerriQi:



*Increased collagen deposition was observed after chronic allergic challenges. Collagen are stained green.

This activity restores the stretchiness of the lung tissue and lung capacity.

1 Shaw, O. M., Hurst, R. D., & Harper, J. L. (2016). Boysenberry ingestion supports fibrolytic macrophages with the capacity to ameliorate chronic lung remodeling. *American Journal of Physiology-Lung Cellular and Molecular Physiology*, 311(3), L628-L638.

2 Shaw, O. M., Hurst, R. D., Cooney, J., Sawyer, G. M., Dinnan, H., & Martell, S. (2021). Boysenberry and apple juice concentrate reduced acute lung inflammation and increased M2 macrophage-associated cytokines in an acute mouse model of allergic airways disease. *Food science & nutrition*, 9(3), 1491-1503.



For more information contact
info@anagenix.com