



Mineral Resources International, Inc.

MRI's Concentrated Mineral Drops for Lung Health

Pollution is becoming more of a problem throughout the world. As the air worsens, we are seeing an increasing number of ill effects on the lungs. Poor air quality causes oxidative stress and can lead to the development of infections, lung cancer, and chronic lung diseases such as asthma, emphysema, and chronic obstructive pulmonary disease (COPD).^{1,2} While we should all work to lower air pollution, most of the problem is out of our personal control. Moreover, while governments may be working to reduce pollution levels, it is still necessary for individuals to take the necessary precautions in order to protect their health. Air pollution directly influences respiratory infections and lung cancer.³ Urban air pollution is estimated to contribute to 1.3 million deaths worldwide per year.³ The World Health Organization (WHO) recommends in its Air Quality Guidelines that populations target reducing particulate matter pollution from 70 to 20 micrograms per cubic metre. By doing so, the WHO estimates a reduction in air quality related deaths by 15 percent.³ A recent study found that in China, where total suspended particulates can often be over 500 micrograms per cubic meter, that life expectancy was 5.5 years lower. This can mostly be attributed to the increases in cardiorespiratory deaths.⁴ Sixteen of the planet's 20-most-polluted cities are located in China, according to the World Bank.⁵

Magnesium, an essential mineral, is well documented to facilitate a host of different physiologic and biochemical processes that block lung pollution and influence lung function.⁶ Magnesium is important in order to maintain DNA integrity. Magnesium stabilizes the DNA structure by binding the DNA's negative charge to the DNA and therefore reducing the density. In addition, magnesium is also involved with DNA repair.⁷ Many studies have reported that magnesium may help to protect the body against oxidative stress and systematic inflammation in the body.⁸ Furthermore, low magnesium levels may also affect immune function, which may also contribute to asthma.⁹ Magnesium is also a cofactor in enzyme activation reactions that require adenine triphosphate (ATP).² Since ATP is the form of energy used by all of our cells in the body, all lung function requires ATP in order to function properly.

Magnesium may also function as an antagonist of calcium's entry into the lung cells. That is, magnesium regulates the amount of calcium in our blood. In recent years, calcium intakes have increased due to diet and supplementation. Simultaneously, magnesium levels in the general population have declined. This has led to a calcium-magnesium ratio imbalance. If there is too much calcium in our blood, this may cause muscle contractions or cramps, since magnesium is critical for the electrical conduction

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across cell membranes.⁹ As a result, if there is adequate magnesium in the diet, it may help to regulate bronchial activity by keeping the smooth muscles relaxed. This helps to explain why reduced intakes of magnesium are associated with decreased lung function and health.^{9,10} Magnesium also calms the nervous system. If you are magnesium deficient, your body will have a hard time switching from the sympathetic (flight or fight) state to the parasympathetic (rest and recover) state.¹¹ This is why increasing magnesium relaxes the smooth muscles in the lungs and reduces hyperexcitability⁹. Next, magnesium also acts as a bronchodilator of smooth muscles in the airway, which helps to increase airflow to the lungs². Moreover, magnesium may also depress the central nervous system and cause a calming effect on the lung tissue itself (antihistamine effect on the mast cells)¹². Indeed, when there is too much calcium in the system, calcium actually blocks the magnesium from being available in the lungs. This leads the mast cells of the lung to secrete more chemical mediators such as histamine and acetylcholine, which leads to the contraction of the smooth muscles in the respiratory system⁶.

In addition, magnesium has also been shown to inhibit cholinergic neuromuscular transmission, stabilize mast cells and t-lymphocytes and stimulate the generation of nitric oxide and prostacyclin. Undoubtedly, low magnesium in the diet may be a serious risk factor for lung diseases².

Lung Health

As can be seen above, magnesium is critical for lung health in several ways. Studies have found that low intakes of magnesium in the diet are associated with lower lung function as shown through airway flow rates, airway hyper-reactivity, and increased risk of wheezing.¹³ Thus, it is important that adequate levels of magnesium are taken in the diet.

Asthma:

Asthma is characterized by smooth-muscle spasms in the lung, edema or swelling, inflammation, and over-secretion of mucous into the airways. According the *China Journal of Pediatrics*, asthma rates among children rose 64 percent to a prevalence of 1.97% between 1990 and 2000, with some cities having as high as 4.63 percent of their children under 14 with asthma. Many specialists have estimated that there has been a 40% increase of asthma even within the last five years in China⁵. Magnesium is a known mild bronchodilator and, as a result, increases in the intakes of magnesium in the diet have been proven to be beneficial for lung function responsiveness and decreased

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wheezing. Furthermore, increasing magnesium in the diet has also led to a higher, forced expiratory volume.¹⁴

Moreover, low magnesium intake levels may play a role in the development of asthma with many studies finding that magnesium may even protect against the development of asthma and chronic airway obstruction.^{14,15} For instance, those who had higher magnesium in their diets had better forced expiratory volume and were less likely to report wheezing in the past 12 months.¹⁶ In one study done with 2,566 children in southern California, it was found that low magnesium intakes were associated with lower lung function, with some children functioning as low as 25 percent below normal lung capacities.⁹ Simultaneously, a magnesium deficiency may effect the activity of our white blood cells called neutrophils and this may actually make asthma attacks worse than they otherwise would be. In another study, when measuring asthma patients, it was found that they had lower magnesium levels than their healthy cohorts.¹⁷

Lung Cancer

It has also been shown that low intakes of magnesium in the diet lead to systematic inflammation and that these conditions are associated with increased lung cancer risk¹⁸. In a study measuring newly diagnosed lung cancer patients against healthy controls, there was an inverse association between the dietary intake of magnesium and the risk of lung cancer. Thus, increasing magnesium decreased lung cancer risk by between 17 and 53 percent. In addition, it was believed by the authors of this study that magnesium was able to achieve this effect because it helped maintain genetic stability, regulated cell proliferation, was a protector against inflammation; it maintained healthy lung function and helped to protect against oxidative stress.¹⁹

How Much Magnesium to Take?

According to the World Health Organization, it is recommended that magnesium be taken in the amounts indicated in the following chart:²⁰

	Assumed body weight (kg)	Recommended Nutrient intakes (mg/day)	Mg of mg per kg of body weight
0-6 months breast-fed	6	26	4.5
0-6 months formula-fed	6	36	6
7-12 months	9	54	6
1-3 years	12	60	5.5

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4-6 years	19	76	4
7-9 years	25	100	4
Adolescent females 10-18 years	49	220	4.5
Adolescent males 10-18 years	51	230	3.5
Adult females 19-65 years	55	220	4
Adult males 19-65 years	65	260	4
Adult females 65+ years	54	190	4.1
Adult males 65+ years	64	224	4.1

To summarize, healthy lung function depends on an adequate supply of magnesium in your diet. Mineral Resources International's Concentrated Mineral Drops (CMD) is an excellent way to make sure that you are consuming enough magnesium in your diet. One drop of CMD has roughly 7.33 mg of magnesium in it. Thus, if you need 220 milligrams (mg) of magnesium daily, you should take around 30 drops. Another more conservative way to dose is to take one drop for every 2 kilograms (kg) of body weight. CMD has 220 mg of magnesium per serving as well as a broad range of other minerals and trace elements that are essential for lung health. CMD is best taken as a nutritional spice with the dosage spread out throughout the day in food and drinks. Mineral Resources International's CMD is the highest quality ionic magnesium product on the market with proven, high quality results. Consuming sufficient quantities of magnesium in your diet will help to protect your lungs from the effects of pollution. Magnesium is important for healthy lung function and protects lungs against the ever-worsening pollution in our modern society.

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REFERENCES:

1. "Indoor Air Quality," American Lung Association. (n.d.). *American Lung Association*. Retrieved April 2, 2014, from <http://www.lung.org/associations/charters/mid-atlantic/air-quality/indoor-air-quality.html>
2. Romieu I. Nutrition and lung health. *Int. J Tuberc Lung Dis* 9(4): 362-374.
3. "Ambient (outdoor) air quality and health." (n.d.). *WHO*. Retrieved April 2, 2014, from <http://www.who.int/mediacentre/factsheets>
4. Yuyu Chen, Avraham Ebenstein, Michael Greenstone, and Hongbin Li. Evidence on the impact of sustained exposure to air pollution on life expectancy from China's Huai River policy. *PNAS* 2013; published ahead of print July 8, 2013, doi:10.1073/pnas.1300018110.
5. Doctors blame air pollution for China's asthma increases. *Lancet*. 368 (9537). Aug 2006: 719-720.
6. Landon RA, Young EA. Role of magnesium in regulation of lung function. *J Am Diet Assoc* 1993;93:674-7.
7. Anastassopoulou J. et al. (2002) Magnesium-DNA interaction and the possible relation to magnesium to carcinogenesis. Irradiation and free radicals. *Crit. Rev. Oncol. Hemmatol.*, 42, 79-91.
8. Shivkumar, K. et al. (1997) Magnesium deficiency enhances oxidative stress and collagen synthesis in vivo in the aorta of rats. *Int. J. Biochem Cell Biol.*, 29, 1273-1278.
9. Gilliland FD, Berhane KT, Li YF, Kim DH, Margolis HG. Dietary Magnesium, Potassium, Sodium, and Children's Lung Function. *Am J Epidemiol* 2002; 155: 125-31.
10. Matthew R, Altura B. Magnesium and the lungs. *Magnesium*. 1988; 7: 173-187.
11. Nielsen F, Jornson L, Zeng H., Magnesium Supplementation Improves Indicators of Low Magnesium Status and Inflammatory Stress in Adults Older than 51 Years with Poor Quality Sleep. *Magnesium Research*. 2010. 23(4), 158-168.
12. Rolla G, Bucca C. Hypomagnesia and the bronchial hyperactivity. *Allergy*. 1989; 44:519-521.
13. Britton J, Pavord L, Richard K, et al. Dietary magnesium, lung function, wheezing, and airway hyperactivity in a random adult population sample. *Lancet* 1994; 344: 357-362.
14. Baker JC, Ayres JG. Diet and asthma. *Respiratory Medicine*. 2000; 94:925-934.
15. Rolla G, Bucca C, Bugiana M, Arossa W, Spinaci S. Reduction of histamine-induced bronchoconstriction by magnesium in asthmatic subjects. *Allergy*. 1987; 42:186-188.
16. Britton J, Pavord I, Richards K, et al. Dietary magnesium, lung function, wheezing, and airway hyperreactivity in a random adult population sample. *Lancet* 1994;344:357-62.
17. Baker JC, Tunnicliffe WS, Duncanson RC, et al. Dietary antioxidants and magnesium in type 1 brittle asthma: a case control study. *Thorax* 1999; 54:115-18.
18. King, D. et al. (2005) Dietary magnesium and C-reactive protein levels. *J. Am. Coll. Nutr.*, 24, 166-171.
19. Mahabir S, Wei Q, Barrera SL, Dong YQ, Etzel CJ, Spitz MR, Forman MR. Dietary magnesium and DNA repair capacity as risk factors for lung cancer. *Carcinogenesis*. 2008. 29(5) 949-956.
20. "Chapter 14.Magnesium." (n.d.). *Chapter 14. Magnesium*. Retrieved April 2, 2014, from <http://www.fao.org/DoCREP/004/Y2809E/y2809e>

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