

# THE AFIB REPORT

www.afibbers.org • Editor: Hans R. Larsen, MScChE

## Recipe for Magnesium/Bicarbonate Water

Natural mineral waters with high concentrations of magnesium and bicarbonate ions have long been prized for their health promoting qualities. The famous Apollinaris water contains 104 mg/L of magnesium, but unfortunately is also fairly high in sodium and calcium. Mendocino water contains 130 mg/L of magnesium, but again has fairly high calcium and sodium levels. A more ideal water is Noah's spring water bottled from the Adobe Springs in California. Noah's California Spring Water contains 110 mg/L of magnesium, but only 3 mg/L of calcium and 5 mg/L of sodium. It also contains 529 mg/L of bicarbonate ions and has a pH of 8.3.

Magnesium-rich mineral waters are easily absorbed and have many health benefits due not only to their magnesium content, but also because of their content of bicarbonate ions that help neutralize the carbonic acid formed in the body during metabolic processes. Several studies have shown that an increased intake of bicarbonate may help prevent muscle wasting and bone loss[1-3].

A manufactured magnesium/bicarbonate water, "Unique Water", has recently been developed in Australia. It contains 120 mg of magnesium and 650 mg of bicarbonate per liter and has a pH of 8.3.

Erling Waller, a former afibber, and Jackie Burgess, both frequent contributors to the Bulletin Board, collaborated to develop a recipe for homemade magnesium/bicarbonate water that, in its composition, is very close to both Noah's California Spring Water and Unique Water. The recipe is based on the reaction of magnesium hydroxide (in milk of magnesia) with plain carbonated water according to the formula  $\text{Mg}(\text{OH})_2 + 2\text{CO}_2 \rightarrow \text{Mg}(\text{HCO}_3)_2$ .

Plain Milk of Magnesia (MoM) should be used in the recipe. The "active" ingredient should only be magnesium hydroxide [ $\text{Mg}(\text{OH})_2$ ], 400 mg per teaspoon (5 ml), and the "inactive" ingredient should only be purified water. 41.7% by weight of magnesium hydroxide is magnesium (Mg), so 5 ml of MoM has 167 mg of Mg, and 1 tablespoon has 500 mg of Mg (1 tablespoon = 15 ml).

To prepare the water follow these steps:

1. **Chill completely to refrigerator temperature a 1-liter bottle of fully carbonated water.** Carbonated waters such as *Canada Dry Seltzer*, which consist of only water and carbon dioxide ( $\text{CO}_2$ ), are suitable. Club sodas such as *Schweppes Club Soda* are also suitable; they are carbonated water with a small amount of added sodium.

2. **Shake well the bottle of MoM, then measure out as accurately as possible 3 tablespoons (45 ml) and have it ready.** The plastic measuring cup that comes with the MoM is accurate and ideal for the purpose.
3. **Remove the bottle of carbonated water from the refrigerator without agitating it.** Open it slowly and carefully to minimize the loss of CO<sub>2</sub>. As soon as the initial fizzing settles down, slowly add the pre-measured MoM. Promptly replace the cap on the water bottle and shake it vigorously for 30 seconds or so, making the liquid cloudy. After ½ hour or so the liquid will have cleared, and any un-dissolved magnesium hydroxide will have settled to the bottom of the bottle. Again shake the bottle vigorously for 30 seconds or so, making the liquid cloudy again. When the liquid again clears all of the magnesium hydroxide in the MoM should have reacted with all of the CO<sub>2</sub> to become dissolved (ionized) magnesium and bicarbonate. However, if a small amount of un-dissolved magnesium hydroxide still remains in the bottom of the bottle as a sediment it may be ignored. This 1 liter of concentrated magnesium bicarbonate water will have approximately 1500 mg of magnesium and approximately 7500 mg of bicarbonate. It should be kept in the refrigerator. You may note that the sides of the bottle “cave in” when the liquid clears. This is a sign that the reaction is complete.
4. **To make 4 liters of magnesium bicarbonate drinking water with approximately 125 mg of magnesium and approximately 625 mg of bicarbonate per liter and a pH of approximately 8+** measure and transfer 1/3 liter of the concentrate (333 ml) into a 4-liter container. Fill the container with 3 2/3 liters of plain or purified water, as desired.

Magnesium dissolved in water (ionized) is considerably more bioavailable than is magnesium in solid tablets or capsules. About 50% of the magnesium contained in magnesium/bicarbonate water is absorbed[4,5]. This is 12 times better than the absorption rate for magnesium oxide. So drinking 1 liter of magnesium/bicarbonate water per day would correspond to taking five 500 mg magnesium oxide tablets daily.

The alkaline magnesium/bicarbonate water should be consumed throughout the day. It can be consumed with a meal, but not in such quantities that it results in dilution of stomach acid. Anyone not in the habit of drinking water should begin by consuming small daily amounts, and should take at least a month to reach a consumption of 1 to 2 liters per day.

A survey of afibbers who have tried the magnesium/bicarbonate water concluded that 7 out of 12 found it beneficial. The effect on episode frequency was inconsistent with four participants experiencing fewer episodes, six experiencing more episodes and two observing no change. Similarly with episode duration. Five participants experienced a shortening, five a lengthening and two saw no change in episode duration. It would seem that that the effect of the water on episode severity is highly variable and that each individual afibber need to determine whether it works for him or her through individual experimentation.

A majority (73%) of trial participants reported that the intensity (forcefulness of palpitations) of their episodes was less after starting on the magnesium/bicarbonate water. The remaining 27% reported no change. This finding suggests that magnesium or bicarbonate somehow helps make the palpitations less noticeable. It is worth noting that the two respondents who had not noticed any change in intensity had quite a low daily magnesium intake (114 mg and 250 mg/day respectively). It is possible that magnesium may reduce episode intensity through its action as a natural calcium channel blocker[6,7,8]. This action would reduce heart rate and might result in a feeling of lower intensity.

Eight out of 14 respondents reported other benefits from consuming the water such as a higher daily fluid intake, less heartburn, disappearance of night time leg cramps and fewer ectopic (premature) beats. Only 4 out of 12 reported side effects with loose stools being experienced by

3 participants who were drinking the water with a higher than recommended magnesium concentration.

Thus it would seem that, while the magnesium/bicarbonate water is beneficial for some afibbers, especially in regard to episode intensity, there are afibbers who do not experience benefits from consuming it. In other words, like pharmaceutical drugs and supplements, the water may not be an overall panacea, but may be beneficial to some afibbers.

The magnesium/bicarbonate water made according to the recipe has a pH of about 8.5. Normal tap water has a pH around 7. The pH of blood is very tightly controlled between 7.38 and 7.44. Both higher and lower pH values in the blood (alkalemia and acidemia) can result in arrhythmias. It is also known that metabolic alkalosis can result in hypokalemia (potassium deficiency) which in turn, can cause atrial fibrillation. So all in all, drinking water with a pH of 8.5 may not be beneficial to all. Whether or not it is could well depend on the individual's diet and metabolism.

I have personally found the magnesium/bicarbonate water more agreeable if I neutralize it to a pH of about 7.2. I do this by adding 10-11 drops of a concentrated citric acid solution to 1 liter of the "ready-to-drink" magnesium/bicarbonate water (NOT to the concentrate). I make the citric acid solution by dissolving 4 teaspoons (20 gram) of anhydrous citric acid (available from a pharmacy) in 100 ml of ordinary (preferably filtered or distilled) water. A similar, but less precise result may be obtained by squeezing half a lemon into the water before drinking it

Please also note that patients with kidney failure should not drink this water or consume any other kind of magnesium supplements without the express agreement of their physician.

### **Legal Disclaimer**

**Please note that the maker and consumer of this water assume full responsibility for understanding and complying with the above instructions and recommendations. The information and instructions do not constitute a recommendation to consume this water, and no claims of health benefits from consuming this water are made.**

For more detailed information on manufactured magnesium/bicarbonate water please visit the "Unique Water" web site at <http://www.nonpharmaceutical.com>.

### **References**

1. Frassetto, L., et al. Potassium bicarbonate reduces urinary nitrogen excretion in postmenopausal women. *Journal of Clinical Endocrinology and Metabolism*, Vol. 82, No. 1, 1997, pp. 254-59
2. Frassetto, Lynda A., et al. Estimation of net endogenous noncarbonic acid production in human from diet potassium and protein contents. *American Journal of Clinical Nutrition*, Vol. 68, 1998, pp. 567-83
3. Sebastian, A., et al. Improved mineral balance and skeletal metabolism in postmenopausal women treated with potassium bicarbonate. *New England Journal of Medicine*, Vol. 330, June 23, 1994, pp. 1776-81
4. Sabatier, M., et al. Meal effect on magnesium bioavailability from mineral water in healthy women. *American Journal of Clinical Nutrition*, Vol. 75, January 2002, pp. 65-71
5. Verhas, M., et al. Magnesium bioavailability from mineral water: a study in adult men. *European Journal of Clinical Nutrition*, Vol. 56, May 2002, pp. 442-47
6. [www.barttersite.com/magnesium.htm](http://www.barttersite.com/magnesium.htm)
7. Yamaoka, K, et al. Temperature-sensitive intracellular Mg<sup>2+</sup> block of L-type Ca<sup>2+</sup> channels in cardiac myocytes. *Am J Physiol Heart Circ Physiol*, Vol. 282, No. 3, March 2002, pp. H1092-101

8. Gourgoulianis, KI, et al. Magnesium dynamics and relation to left ventricular function in acute myocardial infarction. Japn Circ J, Vol. 64, No. 5, May 2000, pp. 377-81

THE AFIB REPORT is published 10 times a year by:

Hans R. Larsen MSc ChE, 1320 Point Street, Victoria, BC, Canada, V8S 1A5  
E-mail: [editor@afibbers.org](mailto:editor@afibbers.org) World Wide Web: <http://www.afibbers.org>

Copyright 2009 by Hans R. Larsen

THE AFIB REPORT does not provide medical advice. Do not attempt self-diagnosis or self-medication based on our reports. Please consult your healthcare provider if you are interested in following up on the information presented.