

# Low Dose Lithium

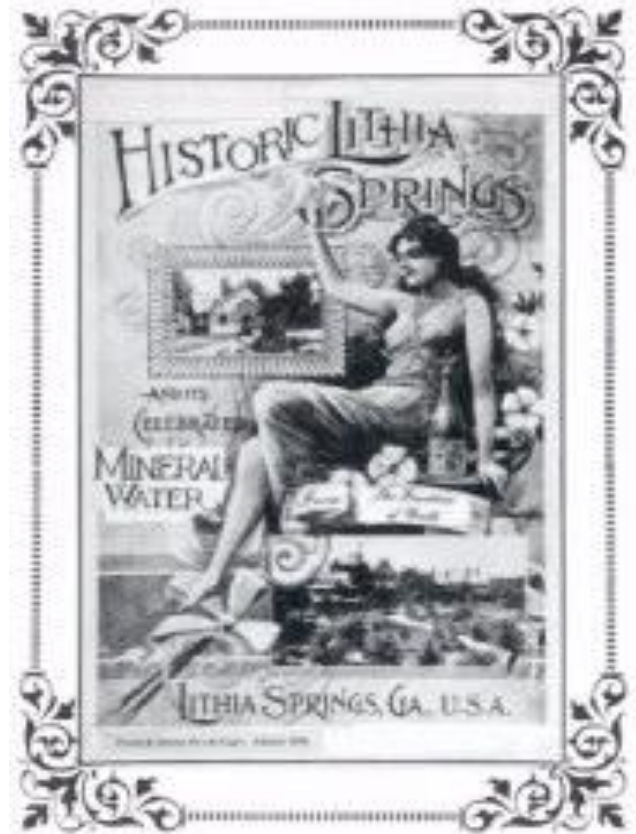
*From The New York Times, 9/15/2014*

The idea of putting a mind-altering drug in the drinking water is the stuff of sci-fi, terrorist plots and totalitarian governments. Considering the outcry that occurred when putting fluoride in the water was first proposed, one can only imagine the furor that would ensue if such a thing were ever suggested.

The debate, however, is moot. It's a done deal. Mother Nature has already put a psychotropic drug in the drinking water, and that drug is lithium. Although this fact has been largely ignored for over half a century, it appears to have important medical implications.

Lithium is a naturally occurring element, not a molecule like most medications, and it is present in the United States, depending on the geographic area, at concentrations that can range widely, from undetectable to around .170 milligrams per liter. This amount is less than a thousandth of the minimum daily dose given for bipolar disorders and for depression that doesn't respond to antidepressants. Although it seems strange that the microscopic amounts of lithium found in groundwater could have any substantial medical impact, the more scientists look for such effects, the more they seem to discover. Evidence is slowly accumulating that relatively tiny doses of lithium can have beneficial effects. They appear to decrease suicide rates significantly and may even promote brain health and improve mood.

Yet despite the studies demonstrating the benefits of relatively high natural lithium levels present in the drinking water of certain communities, few seem to be aware of its potential. Intermittently, stories appear in the scientific journals and media, but they seem to have little traction in the medical community or with the general public.



When I recently attended a psychopharmacology course in which these lithium studies were reviewed, virtually none of the psychiatrists present had been aware of them.

The scientific story of lithium's role in normal development and health began unfolding in the 1970s. Studies at that time found that animals that consumed diets with minimal lithium had higher mortality rates, as well as abnormalities of reproduction and behavior.

Researchers began to ask whether low levels of lithium might correlate with poor behavioral outcomes in humans. In 1990, a study was published looking at 27 Texas counties with a variety of lithium levels in their water. The authors discovered that people whose water had the least amount of lithium had significantly greater levels of suicide, homicide and rape than the people whose water had the higher levels of lithium. The group whose water had the

highest lithium level had nearly 40 percent fewer suicides than that with the lowest lithium level.

Almost 20 years later, a Japanese study that looked at 18 municipalities with more than a million inhabitants over a five-year period confirmed the earlier study's finding: Suicide rates were inversely correlated with the lithium content in the local water supply.

More recently, there have been corroborating studies in Greece and Austria. Not all the research has come to the same conclusion. There was, for example, a negative study in England, although that is tough to assess because the amount of lithium in that location was much lower than that found in the other countries studied.

A recent review of epidemiological studies of lithium in drinking water reported that 9 out of 11 studies found an association between higher levels of lithium in local water and "beneficial clinical, behavioral, legal and medical outcomes."

Trying to make sense of their results, the authors of the Japanese study speculated that lithium exposure, even in these tiny amounts, might actually be neuroprotective or even enhance the growth of neurons. Other studies have supported their speculation; lithium appears to promote the health, growth and resilience of neurons, reducing stress-induced damage.

One study found that at the higher therapeutic doses used to treat mood disorders, brain scans of bipolar patients treated with lithium actually had increased areas of gray matter (neurons) in their brains, compared with bipolar patients who had not been on lithium and with normal controls. The authors speculated that lithium might protect the brain, perhaps promoting neuronal growth.

In the clinical practice of psychiatry, there has been a related finding. Patients with mood disorders have been shown to have rates of dementia higher than those of the general population.

A Danish population study of more than a million subjects discovered that those who purchased lithium only once (presumably people in whom a significant mood disorder had already been diagnosed) had an increased rate of dementia compared with those never exposed to lithium. After taking two or more prescriptions, however, the rate of dementia decreased and remained at those low levels. The authors concluded that, "continued lithium treatment was associated with reduction of the rate of dementia to the same level as that for the general population."

Dr. Nassir Ghaemi, a professor of psychiatry at Tufts University School of Medicine and one of the most active and informed proponents of lithium in the medical community, notes: "Lithium is, by far, the most proven drug to keep neurons alive, in animals and in humans, consistently and with many replicated studies." And, he added, "If lithium prevents dementia, then we may have overlooked a very simple means of preventing a major public health problem."

When the data from the Japanese study was reanalyzed in a second publication, the authors concluded that those people with higher levels of lithium in their water supply had lower levels of "all-cause mortality." Why have these findings been so little discussed in the medical, psychiatric and public health communities?

One could make a case that lithium is the Cinderella of psychotropic medications, neglected and ill used. Reported by an Australian psychiatrist, John Cade, in 1949 to be an effective treatment for bipolar disorder (it was approved as a drug by the Food and Drug Administration in 1970) its efficacy in mood

disorders and suicide prevention has been documented as well as or better than virtually any other psychotropic medication. But it retains a grim and undeserved reputation, perhaps because it was originally associated in the public mind with serious mental illness and because, like many medications, lithium can have serious side effects if not monitored properly. As a psychiatrist, I can tell you that because of its stigma, lithium as a medication is a hard sell to patients with serious mood disorders who could clearly benefit from treatment. But there are undoubtedly other reasons for its neglect. Pharmaceutical companies have nothing to gain from this cheap, ubiquitous element.

Dr. Peter D. Kramer, the author of *Listening to Prozac* and a clinical professor of psychiatry at Brown University, wonders whether there hasn't been enough research done on low-dose lithium because "the mainstream medical establishment distrusts low-dose supplements as somehow ineffective or like homeopathy. And the alternative-medicine crowd shun it because — though it's a salt found in groundwater — lithium already has an identity as a powerful, marketed medication for mental illness."

Lithium has been known for its curative powers for centuries, if not millennia. Lithia Springs, Ga., for example, with its natural lithium-enriched water, appears to have been an ancient Native American sacred site. By the late 19th century Lithia Springs was a famous health destination visited by Mark Twain and Presidents Grover Cleveland, William Howard Taft, William McKinley and Theodore Roosevelt.

Lithium drinks were in huge demand for their reputed health-giving properties, so much so that the element was added to commercial drinks. 7-Up was originally called Bib-Label Lithiated Lemon-Lime Soda and contained lithium citrate right up until 1950. In fact, it's

been suggested that the 7 in 7-Up refers to the atomic mass of the lithium. (Maybe the "Up" referred to mood?) Even beer made with lithia water was available.

By the 1940s, physicians began to give patients with heart disease lithium chloride as a substitute for regular salt, sodium chloride. The high, unregulated doses in this vulnerable population had toxic and even lethal effects. Soon lithium was removed from beverages and other products, and its reputation never recovered.

Today lithium is little discussed despite the huge public appetite for health information. Nor is it much advertised or even available. Scanning the shelves at a local chain store pharmacy, I discovered that standard vitamins did not contain lithium and the nutritional supplement section of the store had no products containing lithium. Lithium was available only in the relatively high-dose medication form that requires a prescription from a physician. Online, however, there are lithium products available including, amazingly enough, the original Lithia spring water.

Some scientists have, in fact, proposed that lithium be recognized as an essential trace element nutrient. Who knows what the impact on our society would be if micro-dose lithium were again part of our standard nutritional fare? What if it were added back to soft drinks or popular vitamin brands or even put into the water supply? The research to date strongly suggests that suicide levels would be reduced, and even perhaps other violent acts. And maybe the dementia rate would decline. We don't know because the research hasn't been done.

For the public health issue of suicide prevention alone, it seems imperative that such studies be conducted. In 2011, suicide was the 10th leading cause of death in the United States. Research on a simple element like lithium that has been around as a medication for over half a

century and as a drink for millenniums may not seem like a high priority, but it should be.

—*Anna Fels is a psychiatrist and faculty member at Weill Cornell Medical College.*

**Update from Dr. Aiken (3/18/17):** Lithium clearly does different things at different doses, and low-dose lithium can be used to prevent depression and suicide. There is new evidence that very small doses levels of lithium (300 micrograms to 150 milligrams daily) can prevent dementia. Lithium can also prevents heart disease, stroke, infection, cancer, and neurologic illnesses.

Some of its health benefits may be due to a protective effect it has on DNA, preventing damage to the ends of DNA (called *telomeres*). This damage is part of what causes aging and cancer.