

# Invited commentary on . . . Lithium levels in drinking water and risk of suicide

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## Summary

Lithium is a well-established treatment in psychiatry. The possibility that lithium from the environment may affect mental health has received little study. However, a recent study and an older report both suggest that higher levels of lithium in drinking water are associated with lower suicide rates. These intriguing data should provoke further

research, which ultimately may benefit community mental health.

## Declaration of interest

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Lithium is a soft alkali metal with a silver-white colour which is thought to have been one of the few elements created in the 'Big Bang'. Perhaps surprisingly, lithium frequently plays an important but unobtrusive role in modern life, providing an essential component in devices as varied as batteries and air filters. Lithium salts have long been used in medicine; in psychiatry, however, lithium will be forever linked with John Cade and his seminal paper, which heralded the dawn of modern drug treatments for severe mental ill health.<sup>1</sup> Lithium as a drug therapy in psychiatry is now accepted and backed by a robust evidence base, with good evidence of benefits for the treatment of bipolar disorder and reducing suicidality in mood disorders.<sup>2,3</sup> However, these data are all derived from randomised controlled trials of pharmacological doses of lithium which give a much higher level in the body than should ever be found in the body naturally. Although traces of lithium are found in the environment, the element has generally been thought not to serve any biological function in humans. However, the paper by Ohgami *et al*<sup>4</sup> (pp. 464–465) may cause us to rethink this assumption.

## What's new?

Lithium is found in variable amounts in foods and, in some areas, drinking water also provides significant amounts of the element.<sup>5</sup> In humans, dietary lithium intake varies over a wide range of values and depends on both geographical location and the type of foods consumed. Traces of lithium were detected in human organs and fetal tissues in the late 19th century, leading to early suggestions that the element may possibly serve specific functions in humans. More recent studies, conducted from the 1970s to the 1990s, suggested that animals maintained on low-lithium diets had higher mortality rates as well as reproductive and behavioural abnormalities.<sup>5</sup> The mechanisms of action of lithium are complex and not fully understood; it is clear, however, that, in the brain, lithium has effects on neurotransmitter function, cellular signalling and neurotrophic factors. At least one previous piece of research has suggested that low lithium intakes from water supplies are associated with increased rates of suicide, homicide and higher arrest rates for drug use and other crimes.<sup>6</sup> Until now, this rather startling observation has been little commented upon. The paper by Ohgami *et al* further examined whether lithium in drinking water could also help to prevent suicide in the community. The authors examined lithium levels in tap water in all 18 municipalities of Oita prefecture in Japan in relation to the standardised mortality ratio of suicide in the individual municipalities and found that lithium levels were significantly and negatively associated with the standardised mortality ratios for 2002–2006. They suggest that even very low

lithium levels in drinking water may have a role in preventing suicide within the population.

## Where next?

Where do we go from here? It would be most unfortunate if these findings became little more than a factual curiosity, of the sort that bright students sometimes use to highlight the limitations of a professor's wisdom. Perhaps we should look to the field of dental health for guidance. Fluoride in the water reduces the risk of dental caries but also has raised a number of issues and controversies: from the biochemical and aesthetic to the rights of the individual to exercise freedom of choice.<sup>7</sup> It would be surprising if lithium in drinking water were not to raise a similar panoply of questions. Despite this, the findings of Ohgami *et al* should not be ignored. A logical first step would be for the Medical Research Council (or a similar body elsewhere) to convene an expert working party to examine the available evidence and suggest further research. Initially, there might be confirmatory epidemiological studies which would establish the reliability of previous findings. Research into the effects of lithium on brain function and the mechanism of action of the antisuicidal effects of lithium (a topic sadly neglected by funding bodies) should be specifically supported. Large-scale trials involving the addition of lithium to drinking water supplies may then be feasible, although this would undoubtedly be subject to considerable debate. Following up on these findings will not be straightforward or inexpensive, but the eventual benefits for community mental health may be considerable.

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