

## Fluoride and children's IQ

The recent article by Choi et al<sup>1</sup> has generated much interest among those following the perennially controversial debate surrounding community water fluoridation (CWF) in New Zealand. The renown of the paper is that the meta-analysis suggests that exposure to fluoride decreases the IQ of children. The validity of that finding has been reinforced by the fact two of authors were from the prestigious Harvard School of Public Health.

A number of validity issues about the study have been overlooked, disregarded, ignored, or misunderstood. The authors themselves were extremely cautious and conservative in the summary of their own analysis. They concluded that 'our results support the possibility of adverse effects', and advocated 'future research to evaluate dose-response relations based on individual-level measures of exposure over time' and 'more precise prenatal exposure assessment'.

The specific studies included in the analysis were all conducted in China and were extremely diverse. The definition of 'high' fluoride levels varied widely between studies while there was also a wide variation in the range of fluoride levels to which the comparison and reference groups had been exposed.

Fluoride exposure came from different sources including drinking water, well water and coal burning. Of the 16 studies which measured fluoride in drinking water, eight reported a statistically significant relationship between high fluoride and lower IQ, in seven IQ was 'lower' but there was no indication of whether this association was statistical significance, and in two studies there was no relationship between fluoride and IQ.

Choi et al acknowledged that the levels of fluoride in the studies involving drinking water, were higher than the levels 'considered acceptable in the US'. They are also much higher than any level likely to be found in New Zealand.

The greatest disservice of Choi et al to the fluoride debate is that their paper did not provide sufficient methodological detail about the individual studies for their validity to be assessed. Choi et al did recognise that 'each of the articles reviewed had deficiencies, in some cases rather serious'.

Many of the studies did not control for the effects of potential confounders such as parental education, and there was a lack of information provided about the selection of the villages or the study populations. As the majority of the papers were ecological in design, the findings from these population groups (e.g. villages) cannot be extrapolated to individuals.

At best, the paper by Choi et al provides nothing more than the merest suggestion of a possible or 'potential' relationship at the population level between children's IQ and fluoride in drinking water at levels much higher than ever likely to occur in New Zealand.

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**Reference:**

1. Choi AL, Sun G, Zhang Y, Grandjean P. Developmental fluoride neurotoxicity: a systematic review and meta-analysis. *Environ Health Perspect* 2012;120:1362–1368.