Developmental Fluoride Neurotoxicity: Choi et al. Respond

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We were interested to read the article by Choi et al. (2012), who investigated the effects of increased fluoride exposure and delayed neurobehavioral development by reviewing published studies and performing a meta-analysis. Of the 39 studies identified, the authors considered 27 to be eligible. Choi et al. reported a mean difference in IQ (intelligence quotient) score between exposed and reference populations of −0.4 (95% confidence interval: −0.5, −0.3) using a random-effects model. Thus, children in high-fluoride areas had significantly lower IQ scores than those who lived in low-fluoride areas.

Even if we ignore the weaknesses of the study (Choi et al. 2012), including a lack of individual-level information and the high probability of confounding because the authors did not adjust for covariates, a difference of 0.4 in mean IQ is clinically negligible (Jeckel et al. 2007; Rothman et al. 2008; Szkl0 and Nieto 2007) even though it was statistically significant. In general, clinical importance takes priority over statistical significance. The p-value can easily change from significant to nonsignificant because of sample size or the mean difference and standard deviation of the variable in the study population (Jeckel et al. 2007; Rothman et al. 2008; Szklo and Nieto 2007). As Choi et al. (2012) pointed out in their conclusion, there is a “possibility of an adverse effect of high fluoride exposure on children’s neurodevelopment.” Such a conclusion can be considered an ecological fallacy, which can easily lead to misinterpretation of the results. It is important to know that statistics cannot provide a simple substitute for clinical judgment (Jeckel et al. 2007; Rothman et al. 2008; Szklo and Nieto 2007). As Choi et al. (2012) pointed out in their conclusion, there is a “possibility of an adverse effect of high fluoride exposure on children’s neurodevelopment.” Such a conclusion can be considered an ecological fallacy, which can easily lead to misinterpretation of the results. It is important to know that statistics cannot provide a simple substitute for clinical judgment (Jeckel et al. 2007; Rothman et al. 2008; Szklo and Nieto 2007).

The authors declare they have no actual or potential competing financial interests.

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