

AADR Comment on Effect of Fluoride Exposure on Children’s IQ Study

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AADR Comment on “Association Between Maternal Fluoride Exposure During Pregnancy and IQ Scores in Offspring in Canada” by Green, et al. in *JAMA Pediatrics* published online August 19, 2019.

The study by Green, et al. adds to the scientific literature on associations between maternal fluoride exposure and early intelligence outcomes. The study, conducted by evaluating maternal urinary fluoride (MUF) and child IQ on 512 mother-child pairs and self-reported maternal fluoride intake and child IQ on 400 mother-child pairs in the Canadian biomonitoring program Maternal-Infant Research on Environmental Chemicals (MIREC) enrolled from 2008-2011, found an association between MUF and lower IQ in boys and maternal fluoride intake and lower IQ in boys and girls. It must be emphasized that this study identifies an *association* between prenatal exposure and IQ and that the results cannot be extrapolated to imply a causative effect of fluoride on IQ. The authors also note that the association between MUF was not found in girls, which was contrary to an earlier similar study in Mexico. [i]

While the study results raise important questions worthy of future research, the authors identify a number of limitations that make it unclear if and how these results should influence current policy on water fluoridation. One of the study’s most significant limitations is the quantification of fluoride intake. Only beverages were considered in the measure of fluoride intake, but there are several common dietary sources of fluoride. [ii] Furthermore, data on beverage intake were collected using self-report, which is subject to recall bias, and the authors did not have access to the concentration of fluoride from each subject’s tap but had to estimate based on where the subject lived. As the authors state, an individual’s tap water could be supplied by multiple treatment plants.

MUF and fluoride intake levels in women who lived in non-fluoridated drinking water areas indicated that other sources of dietary fluoride contributed to total fluoride intake. Therefore, more studies are needed to understand the various sources of dietary and environmental fluoride exposure. Finally, the presence of unknown confounders that were unaccounted for during the analysis could have influenced the results. Furthermore, follow up studies are needed to determine if these early changes in IQ are maintained and have consequences later in life.

Water fluoridation was recognized by the Centers for Disease Control and Prevention (CDC) as one of 10 great public health achievements in the 20th Century. [iii], [iv] Seventy years after the practice began in the United States, water fluoridation is associated with a 30% reduction in tooth decay in children and adolescents and may help reduce income-related oral health inequalities. [v], [vi]

In 2018, AADR Council approved a policy statement affirming both the safety and effectiveness of water fluoridation for the prevention of dental caries and supporting the fluoridation of community water sources to the level of 0.7 milligrams of fluoride per liter of water as recommended by the U.S. Public Health Service. The AADR Science Information Committee and other AADR subject matter experts are currently reviewing the study to evaluate if or how this study — when taken with the numerous studies affirming the safety of water fluoridation — should affect AADR’s current policy. As an organization dedicated to supporting research and translating findings for the improvement of public health, AADR encourages continued research in this area to ensure safe and effective water fluoridation.

About the American Association for Dental Research

The American Association for Dental Research (AADR), headquartered in Alexandria, Va., is a non-profit organization with more than 3,400 members in the United States. Its mission is (1) to advance research and increase knowledge for the improvement of oral health; (2) to support and represent the oral health research community; and (3) to facilitate the communication and application of research findings. The AADR is the largest Division of the International Association for Dental Research (IADR). Learn more about AADR online here: <http://www.iadr.org/AADR/About-Us>.

[i] Bashash M, Thomas D, Hu H, Martinez-Mier EA, Sanchez BN, Basu N, Peterson KE, Ettinger AS, Wright R, Zhang Z, Liu Y, Schnaas L, Mercado-García A, Téllez-Rojo MM, Hernández-Avila M. Prenatal Fluoride Exposure and Cognitive Outcomes in Children at 4 and 6-12 Years of Age in Mexico. *Environ Health Perspect*. 2017;125(9):097017.

[ii] USDA Food Composition Databases. United States Department of Agriculture; Washington, DC; [accessed 16 August 2019].
<https://ndb.nal.usda.gov/ndb/nutrients/report/nutrientsfrm?max=25&offset=0&totalCount=0&nutrient1=313&nutrient2=&subset=0&sort=c&measureby=g>.

[iii] Ten Great Public Health Achievements – United States, 1900-1999. 1999. *MMWR*48(12):241-243. Available at: <https://www.cdc.gov/mmwr/preview/mmwrhtml/00056796.htm>. Accessed 16 April 2018.

[iv] Achievements in Public Health, 1900-1999: Fluoridation of Drinking Water to Prevent Dental Caries. 1999. *MMWR* 48(41):933-940. Available at: <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm4841a1.htm>. Accessed 16 April 2018.

[v] Slade GD, Grider WB, Maas WR, Sanders AE. 2018. Water Fluoridation and Dental Caries in U.S. Children and Adolescents. *Journal of Dental Research*, 97(10), 1122–1128.

[vi] Sanders AE, Grider WB, Maas WR, Curiel JA, Slade GD. 2019. Association Between Water Fluoridation and Income-Related Dental Caries of US Children and Adolescents. *JAMA Pediatr*. 173(3):288–290.