

# Little Things Matter: “The Impact of Fluoridation on Brain Development”

For years, we were led to believe that fluoride is safe. (1,2)

(HODGE VIDEO) (3)

Is fluoride *really* safe?

Let’s look at what we’ve learned over the past century.

In the 1930s, a dentist discovered that children who drank water with naturally high levels of fluoride had fluorosis – the staining or mottling of teeth. (4)

Children with fluorosis had about 5 fewer cavities than children without fluorosis. (5)

Next, scientists showed that *adding* fluoride to drinking water led to less tooth decay. (5)

Unfortunately, tooth mottling increased as more fluoride was added to water. (5,6)

The optimal range or “sweet spot” to prevent tooth decay and minimize mottling was about 1 ppm. (5)

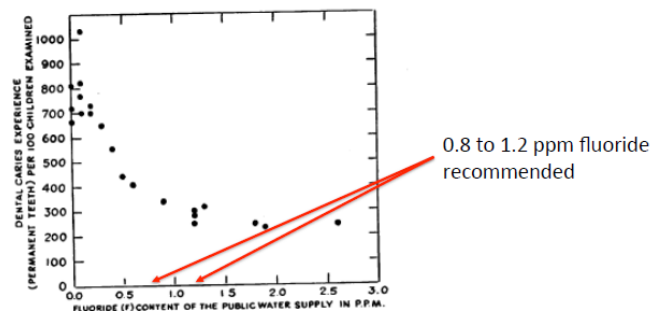


FIGURE 1—Relation between the Amount of Dental Caries (permanent teeth) Observed in 7,257 Selected 12–14 Year Old White School Children of 21 Cities of 4 States and the Fluoride (F) Content of the Public Water Supply \*

\* From Dean, H. T., Arnold, F. A., Jr., and Elvove, E. *Pub. Health Rep.*, 57:1155 (Aug. 7), 1942.

Meanwhile, the sugar industry, which knew sugar caused tooth decay, promoted the use of fluoride and mounted a campaign to thwart efforts to reduce sugar consumption. (7)

Then, beginning in the 1970s, soon after fluoride was added to toothpaste, cavities declined sharply in countries with water fluoridation. (8)

36  
37 But they *also* declined in countries *without* fluoridation. (8)  
38  
39 Today, about 75% of Americans (9) and 38% of Canadians (10) drink fluoridated water.<sup>1</sup>  
40  
41 A new study showed that water fluoridation prevents about one cavity per child. (11)  
42  
43 Still, over 90% of Americans have tooth decay. (12)  
44  
45 Meanwhile, scientists began to find clues that fluoride was toxic to the developing brain. (13–15)  
46  
47 Everybody agrees that fluoride is toxic at very high levels. (16)  
48  
49 What about lower levels?  
50  
51 In over a dozen studies – mostly from China – children who lived in villages with naturally high levels of  
52 fluoride had about 7 fewer IQ points than children in other villages. (15)  
53  
54 But those levels were somewhat higher than those found in North America.  
55  
56 Two newer studies of pregnant women and their children – one in Mexico (17), where fluoride is added  
57 to salt, and other one in Canada (18), where fluoride is added to water – also found that fluoride led to  
58 IQ deficits in children.  
59  
60 As fluoride levels increased in pregnant women from .1 ppm to 1 ppm, the IQ scores of their children  
61 dropped, by about 3 to 5 points. (17,18)  
62  
63 What about infants?  
64  
65 As fluoride increased in infants, their IQ scores dropped further, especially in formula-fed babies. (19)  
66  
67 Infants who are fed formula made with fluoridated tap water ingest more fluoride than a breastfed  
68 infant; breastmilk contains low amounts of fluoride. (20–25)

---

<sup>1</sup> These numbers are based on the American and Canadian population on community water systems.

69

70 Some critics say that because our study was an observational study – we didn't dose pregnant women  
71 with fluoride, like a drug study – it was inconclusive. (26)

72

73 But if we dismissed all observational studies, we would have little evidence that *water fluoridation*  
74 prevents tooth decay. (27)

75

76 Some critics say it is only one study. (26,28)

77

78 But that ignores over a dozen high-quality studies showing that fluoride is toxic to the developing brain.  
79 (29,30)

80

81 Some critics say it is of little consequence if a child loses 3 to 5 IQ points. (26)

82

83 Is it worth losing 5 IQ points to prevent one cavity?

84

85 Let's look at the impact of reducing children's IQ score by 5 points.

86

87 Most of us have IQ scores that fall between 85 and 115 points. (31)

88

89 Only 2.5% of children have an IQ above 130, which is considered gifted. There are about 6 million  
90 children in this group. (32)

91

92 On the other end of the distribution, another 2.5% of children have an IQ below 70, which is  
93 considered "challenged." (32)

94

95 A 5-point drop in IQ results in a 57% increase in the number of children that are challenged, from 6  
96 million to 9.4 million.

97

98 There is a corresponding decrease in the number of children that are gifted, from 6 million to 2.4  
99 million. (33)

100

101 What's more, children are often to exposed to many chemicals that impair brain development – like  
102 lead, air pollution, pesticides *and* fluoride. The impact of 3 or 4 toxic chemicals adds up and greatly  
103 increases the number of children who are challenged. (34)

104  
105 What can you do?  
106  
107 Pregnant women and infants should reduce fluoride intake. After all, it only benefits children once their  
108 teeth have erupted.(35)  
109  
110 If you are pregnant, don't drink fluoridated water or black tea.<sup>2</sup> (36)  
111  
112 If possible, breastfeed your baby. (37,38)  
113  
114 Otherwise, don't use fluoridated water to make infant formula. (19)  
115  
116 Children should only use a rice-sized amount of toothpaste when they brush their teeth, not the  
117 amount shown on toothpaste commercials and they shouldn't swallow it. (39)  
118  
119 Adding fluoride to water isn't the *only way* to prevent cavities.  
120  
121 You can choose not to buy products from companies that market sweetened drinks and highly  
122 processed foods to children. After all, sugar is the main cause of tooth decay. (7)  
123  
124

---

<sup>2</sup> Black teas have high concentrations of natural fluoride due to the accumulation of fluoride in tea leaves from the soil (Fung et al., 1999).

125 SOURCES

- 126 1. Allukian Jr, M., Carter-Pokras, O.D., Gooch, B.F., Horowitz, A.M., Iida, H., Jacob, M.,  
127 Kleinman, D.V., Kumar, J., Maas, W.R., Pollick, H., Rozier, R.G. (2018). Science, politics, and  
128 communication: The case of community water fluoridation in the US. *Annals of epidemiology*,  
129 28(6), 401–410. 10.1016/j.annepidem.2017.05.014
- 130 2. Zelko, F. (2019). Optimizing nature: Invoking the “natural” in the struggle over water  
131 fluoridation. *History of Science*, 57(4), 518-539. 10.1177/0073275318809764
- 132 3. Nightair (2013, September 27). The Fluoride Deception (Interview) [Video file]. YouTube,  
133 <https://www.youtube.com/watch?v=gZQUkQ2f9QQ>
- 134 4. Smith, F.C. (1916). Mottled enamel and brown stain: A condition affecting the teeth in certain  
135 localities. *Public Health Reports (1896-1970)*, 31(42), 2915–2918. 10.2307/4574196
- 136 5. Dean, H.T., Arnold, F.A., Jr. Elvove, E. (1942). Domestic water and dental caries. V. Additional  
137 studies of the relation of fluoride domestic waters to dental caries experience in 4,425 white  
138 children, aged 12 to 14 years, of 13 cities and 4 States. *Public Health Reports (1896-1970)*,  
139 57(32), 1155-1179. 10.2307/4584182\
- 140 6. Leverett, D. (1986). Prevalence of dental fluorosis in fluoridated and nonfluoridated  
141 communities—a preliminary investigation. *Journal of public health dentistry*, 46(4), 184–97.  
142 10.1111/j.1752-7325.1986.tb03140.x
- 143 7. Kearns, C.E., Glantz, S.A., Schmidt, L.A. (2015). Sugar industry influence on the scientific  
144 agenda of the national institute of dental research's 1971 National Caries Program: A historical  
145 analysis of internal documents. *PLoS Med*, 12(3), 1–22. 10.1371/journal.pmed.1001798
- 146 8. Marthaler, T.M. (2004). Changes in dental caries 1953-2003. *Caries research*, 38(3), 173–81.  
147 10.1159/000077752
- 148 9. U.S. Department of Health and Human Services Federal Panel on Community Water  
149 Fluoridation. (2015). U.S. Public Health Service recommendation for fluoride concentration in  
150 drinking water for the prevention of dental caries. *Public Health Reports*, 130(4), 318-331.  
151 10.1177/003335491513000408
- 152 10. Public Health Agency of Canada. (2017). *The state of community water fluoridation (CWF)*  
153 *across Canada*.
- 154 11. Slade, G.D., Grider, W.B., Maas, W.R., Sanders, A.E. (2018). Water fluoridation and dental  
155 caries in U.S children and adolescents. *Journal of dental research*, 97(10), 1122-1128.  
156 10.1177/0022034518774331
- 157 12. Centers for Disease Control and Prevention. (2019). Oral Health Surveillance Report: Trends in  
158 Dental Caries and Sealants, Tooth Retention, and Edentulism, United States, 1999–2004 to

- 2011–2016. *Atlanta, GA: Centers for Disease Control and Prevention, US Dept of Health and Human Services.*
13. National Research Council (NRC). (2006). *Fluoride in Drinking Water: A Scientific Review of EPA's Standards.* Washington, DC: National Academies Press.
14. Mullenix, P.J., Denbesten, P.K., Schunior, A., Kernan, W.J. (1995). Neurotoxicity of sodium fluoride in rats. *Neurotoxicology and teratology*, 17(2), 169–77.  
10.1016/0892-0362(94)00070-T
15. Choi, A.L., Sun, G., Zhang, Y., Grandjean, P. (2012). Developmental fluoride neurotoxicity: A systematic review and meta-analysis. *Environmental Health Perspectives*, 120(10), 1362–1368. 10.1289/ehp.1104912
16. Gessner, B.D., Beller, M., Maddaugh, J.P., Whitford, G.M. (1994). Acute fluoride poisoning from a public water system. *New England Journal of Medicine*, 330(2), 95-99.  
10.1056/NEJM199401133300203
17. Bashash, M., Thomas, D., Hu, H., Martinez-Mier, E.A., Sanchez, B.N., Basu, N., Peterson, K.E., Ettinger, A.S., Wright, R., Zhang, Z., Liu, Y., Schnaas, L., Mercado-García, A., Téllez-Rojo, M.M., Hernández-Avila, M. (2017). Prenatal fluoride exposure and cognitive outcomes in children at 4 and 6 – 12 years of age in Mexico. *Environmental Health Perspective*, 125(9), 1-12. 10.1289/EHP655
18. Green, R., Lanphear, B., Hornung, R., Flora, D., Martinez-Mier, E.A., Neufeld, R., Ayotte, P., Muckle, G., Till, C. (2019). Fluoride exposure during fetal development and intellectual abilities in a Canadian birth cohort. *JAMA Pediatrics*, 173(10), 940-948.  
10.1001/jamapediatrics.2019.1729
19. Till, C., Green, R., Flora, D., Hornung, R., Martinez-Mier, EA., Blazer, M., Farmus, L., Ayotte, P., Muckle, G., Lanphear, B. (2020). Fluoride exposure from infant formula and child IQ in a Canadian birth cohort. *Environmental International*, 134, 105315.  
10.1016/j.envint.2019.105315
20. Dabeka, R.W., Karpinski, K.F., McKenzie, A.D., Bajdik, C.D. (1986). Survey of lead, cadmium and fluoride in human milk and correlation of levels with environmental and food factors. *Food and chemical toxicology*, 24(9), 913-921. 10.1016/0278-6915(86)90318-2
21. Ekstrand, J., Boreus, L.O., de Chateau, P. (1981). No evidence of transfer of fluoride from plasma to breast milk. *British medical journal (Clinical research ed.)*, 283(6294), 761–762.  
10.1136/bmj.283.6294.761
22. Ekstrand, J., Hardell, L., Spak, C. (1984). Fluoride balance studies on infants in a 1-ppm-water-fluoride area. *Caries research*, 18(1), 87–92. 10.1159/000260753

- 193 23. Esala, S., Vuori, E., Helle, A. (1982). Effect of maternal fluorine intake on breast milk fluorine  
194 content. *British journal of nutrition*, 48(2), 201-204. 10.1079/BJN19820105
- 195 24. Faraji, H., Mohammadi, A. A., Akbari-Adergani, B., Saatloo, N. V., Lashkarboloki, G., Mahvi, A.  
196 H. (2014). Correlation between fluoride in drinking Water and its levels in breast milk in  
197 Golestan Province, Northern Iran. *Iranian Journal of Public Health*, 43(12), 1664-1668.
- 198 25. Zohoori, F. V., Omid, N., Sanderson, R. A., Valentine, R. A., & Maguire, A. (2019). Fluoride  
199 retention in infants living in fluoridated and non-fluoridated areas: effects of weaning. *British*  
200 *Journal of Nutrition*, 121(1), 74-81. 10.1017/S0007114518003008
- 201 26. Science Media Center. (2019, August 19). *Expert reaction to study looking at maternal*  
202 *exposure to fluoride and IQ in children*. [https://www.sciencemediacentre.org/expert-reaction-to-](https://www.sciencemediacentre.org/expert-reaction-to-study-looking-at-maternal-exposure-to-fluoride-and-iq-in-children/)  
203 [study-looking-at-maternal-exposure-to-fluoride-and-iq-in-children/](https://www.sciencemediacentre.org/expert-reaction-to-study-looking-at-maternal-exposure-to-fluoride-and-iq-in-children/)
- 204 27. Ihezor-Ejiofor, Z., Worthington, H.V., Walsh, T., O'Malley, L., Clarkson, J.E., Macey, R., Alam, R.,  
205 Tugwell, P., Welch, V., Glenny, A. (2015). Water fluoridation for the prevention of dental caries.  
206 *Cochrane Database of Systematic Reviews*, 2015(6), CD010856.  
207 10.1002/14651858.CD010856.pub2
- 208 28. Burger, D., Garvin, J. (2019, August 27). *Responses to fluoride study flood in from all over the*  
209 *globe*. American Dental Association. [https://www.ada.org/en/publications/ada-news/2019-](https://www.ada.org/en/publications/ada-news/2019-archive/august/responses-to-fluoride-study-flood-in-from-all-over-the-globe)  
210 [archive/august/responses-to-fluoride-study-flood-in-from-all-over-the-globe](https://www.ada.org/en/publications/ada-news/2019-archive/august/responses-to-fluoride-study-flood-in-from-all-over-the-globe)
- 211 29. NTP. (2019). Draft NTP Monograph on the Systematic Review of Fluoride Exposure and  
212 Neurodevelopmental and Cognitive Health Effects.
- 213 30. Grandjean, P. (2019). Developmental fluoride neurotoxicity: an updated review. *Environmental*  
214 *Health*, 18(1), 1-17. 10.1186/s12940-019-0551-x
- 215 31. Wechsler, D. (1999). Manual for the Wechsler abbreviated intelligence scale (WASI). *San*  
216 *Antonio, TX: The Psychological Corporation*.
- 217 32. Sattler J.M. (2008). *Assessment of children: Cognitive foundations* (5th ed). La Mesa,  
218 California: Sattler, Publisher, Inc.
- 219 33. Lanphear, B. P., Vorhees, C. V., Bellinger, D. C. (2005). Protecting children from environmental  
220 toxins. *PLoS Med*, 2(3), e61. 10.1371/journal.pmed.0020061
- 221 34. Lanphear, B. P. (2015). The impact of toxins on the developing brain. *Annual Review of Public*  
222 *Health*, 36(1), 211-230. 10.1146/annurev-pubhealth-031912-114413
- 223 35. Limeback, H. (1999). A re-examination of the pre-eruptive and post-eruptive mechanism of the  
224 anti-caries effects of fluoride: is there any anti-caries benefit from swallowing  
225 fluoride?. *Community dentistry and oral epidemiology*, 27(1), 62-71. 10.1111/j.1600-  
226 0528.1999.tb01993.x

- 227 36. Rodríguez, I., Burgos, A., Rubio, C., Gutiérrez, A. J., Paz, S., da Silva Júnior, F. M. R.,  
228 Hardisson, A., Revert, C. (2020). Human exposure to fluoride from tea (*Camellia sinensis*) in a  
229 volcanic region—Canary Islands, Spain. *Environmental Science and Pollution Research*, 1-12.  
230 10.1007/s11356-020-10319-9
- 231 37. Jeffrey, N., Canadian Paediatric Society, Nutrition and Gastroenterology Committee. (2013).  
232 Nutrition for healthy term infants, birth to six months: An overview. *Paediatrics & Child*  
233 *Health*, 18(4), 206-207. 10.1093/pch/18.4.206
- 234 38. Eidelman A.I, Schnaler, R.J. (2012). Breastfeeding and the use of human milk. *Pediatrics*,  
235 129(3), e827–841. 10.1542/peds.2011-3552
- 236 39. Thornton-Evans, G., Junger, M. L., Lin, M., Wei, L., Espinoza, L., & Beltran-Aguilar, E. (2019).  
237 Use of Toothpaste and Toothbrushing Patterns Among Children and Adolescents—United  
238 States, 2013–2016. *Morbidity and Mortality Weekly Report*, 68(4), 87-90.  
239 10.15585/mmwr.mm6804a3
- 240  
241  
242