Fluoridation Policy:

An Annotated Bibliography of Published Science

A sampling of the scientific studies and reports relevant to water fluoridation published since the HHS 2015 recommendation to lower the fluoridation target to 0.7 ppm is listed below.

I suggest these items provide compelling evidence that 0.7 ppm is neither optimal nor safe and that any claims to the contrary are ill-founded. Moreover, protests that more study is required before banning fluoridation is a tacit endorsement of human experimentation without individual consent which is medical assault - *Karen F. Spencer*

2021

BENCHMARK DOSE ANALYSIS: Using fluoride studies from MIREC and ELEMENT projects as input, the results of which are consistent with other studies, authors identify 0.2 mg/L as having an adverse impact on neurodevelopment. “The prospective studies offer strong evidence of prenatal neurotoxicity, and the benchmark results should inspire a revision of water-fluoride recommendations aimed at protecting pregnant women and young children.” https://pubmed.ncbi.nlm.nih.gov/34101876/

- Grandjean P, Hu H, Till C, Green R, Bashash M, Flora D, Tellez-Rojo MM, Song P, Lanphear B, Budtz-Jørgensen E. A Benchmark Dose Analysis for Maternal Pregnancy Urine-Fluoride and IQ in Children. Risk Analysis. 8 June 2021.

LIFETIME EXPOSURE: Fluoridation is the primary source of fluoride exposure for 1,629 Canadians between 3 and 79 that finds substantially higher lifetime fluoride exposure in fluoridated communities using CHMS data, increasing with age. Vulnerable subpopulations to adverse effects of fluoride noted as the young, those who are iodine deficient, and post-menopausal women. https://www.mdpi.com/1660-4601/18/12/6203/htm

- Julia K. Riddell, Ashley J. Malin, Hugh McCague, David B. Flora, and Christine Till. Urinary Fluoride Levels among Canadians with and without Community Water Fluoridation. Int. J. Environ. Res. Public Health 2021, 18(12), 6203.

KIDNEYS: This study of 1,070 adults found every 1 mg/L increment in the urinary fluoride concentrations was associated with significant increases of 22.8% in the risk of kidney function injury after adjusting for potential confounding factors. Authors conclude that long-term fluoride exposure is associated with compromised kidney function in adults, and that urinary NAG is a sensitive and robust marker of kidney dysfunction caused by fluoride exposure. https://pubmed.ncbi.nlm.nih.gov/34478979/

- Wu L, Fan C, Zhang Z, Zhang X, et al. Association between fluoride exposure and kidney function in adults: A cross-sectional study based on endemic fluorosis area in China. Ecotoxicol Environ Saf. 2021 Aug 31;225:112735.

BEHAVIORAL CHANGES: Children in Cincinnati Childhood Allergy and Air Pollution Study (CCAAPS) assessed at age 12. Boys in particular did not experience significant anxiety or depression, yet had somatic behaviors based on their childhood urinary fluoride (CUF) concentrations, “seven times more likely to exhibit ‘at-risk’ internalizing symptomology.” https://pubmed.ncbi.nlm.nih.gov/34755609/

- Adkins EA, Yolton K, Strawn JR, Lippert F, Ryan PH, Brunst KJ. Fluoride exposure during early adolescence and its association with internalizing symptoms. Environ Res. 2021 Oct 29:112296.

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CRITICAL WINDOWS: Using urine samples and test scores from 596 mother-child Canadian pairs in the MIREC prospective cohort, researchers found evidence that developmental neurological damage was based on timing of fluoride exposure and gender, "Associations between fluoride exposure and PIQ (performance IQ) differed based on timing of exposure. The prenatal window may be critical for boys, whereas infancy may be a critical window for girls." https://pubmed.ncbi.nlm.nih.gov/34051202/

- Farmus L, Till C, Green R, Hornung R, Martinez-Mier EA, Ayotte P, Muckle G, Lanphear B, Flora D. Critical Windows of Fluoride Neurotoxicity in Canadian Children. Environ Res. 2021 May 26:111315.

GENES: Several genes make individuals more vulnerable to the neurotoxic impact with gender differences, also affecting mitochondria and suggesting vulnerability to dementia. Chinese study of 952 school children between 7 and 13 using water, urinary, hair and nail fluoride identified multiple neurodevelopmental metabolic pathways that result in adverse effects from low fluoride exposures. https://www.sciencedirect.com/science/article/pii/S0160412021003068

- Yu X, Xia L, Zhang S, et al. Fluoride exposure and children's intelligence: Gene-environment interaction based on SNP-set, gene and pathway analysis, using a case-control design based on a cross-sectional study. Environ Int. 2021 Jun 4;155:106681.

GENETIC VULNERABILITY: Dopamine relative genes affect the susceptibility of individuals to fluoride toxicity even in safe water concentrations which result in lowered IQ so that "low-moderate fluoride exposure is inversely related to children's IQ." https://pubmed.ncbi.nlm.nih.gov/33360592/

- Zhao L, Yu C, Lv J, et al. Fluoride exposure, dopamine relative gene polymorphism and intelligence: A cross-sectional study in China. Ecotoxicology and Environmental Safety. 2021 Feb;209:111826.

BRITTLE BONES: "In this cohort of postmenopausal women, the risk of fractures was increased in association with two separate indicators of fluoride exposure. Our findings are consistent with RCTs and suggest that high consumption of drinking water with a fluoride concentration of ~1 mg/L may increase both BMD (bone mineral density) and skeletal fragility in older women." https://pubmed.ncbi.nlm.nih.gov/33822648/

- Helte E, Donat Vargas C, Kippler M, Wolk A, Michaëlsson K, Åkesson A. Fluoride in Drinking Water, Diet, and Urine in Relation to Bone Mineral Density and Fracture Incidence in Postmenopausal Women. Environ Health Perspect. 2021 Apr;129(4):47005.

OSTEOARTHRITIS: Identifies fluoride as an environmental chemical that has adverse effects on articular cartilage and osteoarthritis (OA) risk. "In full sample analysis, a 1 mg/L increase in UF (urinary fluoride) level was associated with a 27% higher risk of OA." https://link.springer.com/article/10.1007/s12011-021-02937-2

- Sowanou, A., Meng, X., Zhong, N. et al. Association Between Osteoarthritis and Water Fluoride Among Tongyu Residents, China, 2019: a Case–Control of Population-Based Study. Biol Trace Elem Res (2021).

NO BENEFIT FOR PRESCHOOLERS: Polish study finds 'optimal' fluoride concentrations in water provide no dental benefit. Dental caries experience depended on oral hygiene and diet. https://www.sciencedirect.com/science/article/abs/pii/S0946672X2100016X

- Opydo-Szymaczek J, et al. Fluoride exposure and factors affecting dental caries in preschool children living in two areas with different natural levels of fluorides. Journal of Trace Elements in Medicine and Biology. Volume 65. 2021.

ALTERNATIVE: This systematic review and meta-analysis concludes that biomimetic hydroxyapatite-containing, fluoride-free oral care products are effective in reducing dental decay, especially in children without the risk of dental fluorosis and neurotoxicity inherent in topical use of fluoridated products. https://files.cdha.ca/profession/journal/2752.pdf

- Hardy Limeback, BSc, PhD, DDS; Joachim Enax, Dr; Frederic Meyer, Dr. Biomimetic hydroxyapatite and caries prevention: a systematic review and meta-analysis. | Can J Dent Hyg 2021;55(3): 148-159.

AMERICAN KIDNEYS: Using U.S. NHANES data from two recent cycles, finds 'optimal' amounts of fluoridated water results in high incidence of uric acid in adolescents suggesting higher risk of kidney disease and other illnesses. Identifies dose-response trend in plasma fluoride of teens.
https://www.sciencedirect.com/science/article/pii/S0147651320315074

- Yudan Wei, Jianmin Zhu, Sara Ann Wetzstein. Plasma and water fluoride levels and hyperuricemia among adolescents: A cross-sectional study of a nationally representative sample of the United States for 2013–2016. Ecotoxicology and Environmental Safety. Volume 208. 15 January 2021.

TODDLERS: The Programming Research in Obesity, Growth, Environment and Social Stressors (PROGRESS) cohort included 948 mother-child pairs from Mexico City. Blinded testing of children between one and 24 months to examine associations between maternal fluoride intake from food and beverages during pregnancy and offspring neurodevelopment in this prospective and longitudinal study found, "higher exposure to fluoride from food and beverage consumption in pregnancy was associated with reduced cognitive outcome, but not with language and motor outcome in male offspring over the first two years of life."
https://fluoridealert.org/wp-content/uploads/cantoral-2021.final_.pdf

- Alejandra Cantoral, Martha M. Tellez-Rojo, Ashley J. Malin, Lourdes Schnaas d, ErikaOsorio-Valencia, Adriana Mercadob, E. Angeles Martínez-Mier, Robert O. Wright, Christine Till. Dietary fluoride intake during pregnancy and neurodevelopment in toddlers: A prospective study in the progress cohort. Neurotoxicology 87 (2021) 86–93.

NO SAFE DOSE: Study of Mexican children and their mothers using measurements of urinary fluoride and water concentrations associated dental fluorosis and lowered IQ with fluoride dose consistent with findings of larger studies in other countries. Authors declare WHO fluoride guidelines are unsafe and hypothesize that 0.045 F^- mg/day is a protective exposure
https://www.mdpi.com/1660-4601/18/21/11490/htm

- Farías P, Estevez-García JA, Onofre-Pardo EN, Pérez-Humara ML, Rojas-Lima E, Álamo-Hernández U, Rocha-Amador DO. Fluoride Exposure through Different Drinking Water Sources in a Contaminated Basin in Guanajuato, Mexico: A Deterministic Human Health Risk Assessment. International Journal of Environmental Research and Public Health. 2021; 18(21):11490.

BABY BRAIN POISON: Exposure to fluoridated water (10 mg/L & 50 mg/L) beginning on the first day of pregnancy and continuing through the last day of breastfeeding shows chemical imbalances, cellular damage and changes in the hippocampus of Wistar rat offspring that would affect neurological development.
https://pubmed.ncbi.nlm.nih.gov/33096359/

- Ferreira MKM, Aragão WAB, Bittencourt LO, Puty B, Dionizio A, Souza MPC, Buzalaf MAR, de Oliveira EH, Crespo-Lopez ME, Lima RR. Fluoride exposure during pregnancy and lactation triggers oxidative stress and molecular changes in hippocampus of offspring rats. Ecotoxicology and Environmental Safety. 2021 Jan 15;208:111437.

GUTS & BRAINS: Memory function was reduced and gut microbiota structure was significantly altered in fluoride-exposed mice.
https://www.sciencedirect.com/science/article/pii/S0147651321002190

- Xin J, Wang H, Sun N, Bughio S, Zeng D, Li L, Wang Y, Khalique A, Zeng Y, Pan K, Jing B, Ma H, Bai Y, Ni X. Probiotic alleviate fluoride-induced memory impairment by reconstructing gut microbiota in mice. Ecotoxicol Environ Saf. 2021 Jun 1;215:112108

INFLAMED GUTS: Exposure to fluoridated water at both doses (10 mg/L & 50 mg/L) inflame guts in rats and alters the gut microbiome as compared to control (0 mg/L).
https://pubmed.ncbi.nlm.nih.gov/33508686/

- Dionizio A, Uyghurturk DA, Melo CGS, Sabino-Arias IT, Araujo TT, Ventura TMS, Perles JVCM, Zanoni JN, Den Besten P, Buzalaf MAR. Intestinal changes associated with fluoride exposure in rats: Integrative morphological, proteomic and microbiome analyses. Chemosphere. 2021 Jan 11;273:129607.

HARMFUL ADEQUATE INTAKE (AI): Study found "the levels of dietary F- intake were below the current AI, were greater towards the end of gestation and in women who were moderately and highly compliant with Mexican dietary recommendation" in ELEMENT cohort and recommended changing future dietary recommendations due to evidence of developmental neurotoxicity at even low dose exposure. https://pubmed.ncbi.nlm.nih.gov/33602354/

- Castiblanco-Rubio, G., Muñoz-Rocha, T., Cantoral, A., Téllez-Rojo, M., Ettinger, A., Mercado-García, A., Peterson, K.E., Hu, H., Martínez-Mier, E. (2021). Dietary Fluoride Intake Over the Course of Pregnancy in Mexican Women. Public Health Nutrition, 1-25.

CALCIUM & FLUORIDE IN PREGNANCY: Calcium intake during pregnancy lowers urinary fluoride (UF) concentrations by some unknown mechanism in ELEMENT cohort.
https://pubmed.ncbi.nlm.nih.gov/34176079/

- Castiblanco-Rubio GA, Muñoz-Rocha TV, Téllez-Rojo MM, Ettinger AS, Mercado-García A, Peterson KE, Hu H, Cantoral A, Martínez-Mier EA. Dietary Influences on Urinary Fluoride over the Course of Pregnancy and at One-Year Postpartum. Biol Trace Elem Res. 2021 Jun 26.

SAFETY: Evidence of dental fluorosis and other adverse effects to bodies and brains from supposed safe concentrations is alarming. "The safety of public health approach of drinking water fluoridation for global dental caries reduction are urgently needed further research."
https://www.sciencedirect.com/science/article/pii/S0147651321005510?via%3Dihub

- Dong H, Yang X, Zhang S, Wang X, Guo C, Zhang X, Ma J, Niu P, Chen T. Associations of low level of fluoride exposure with dental fluorosis among U.S. children and adolescents, NHANES 2015-2016. Ecotoxicol Environ Saf. 2021 Jun 22;221:112439.

SKELETAL FLUOROSIS: This Chinese study of the pathogenetic progression of skeletal fluorosis, details how local signaling pathways, hormones, promoter DNA hypermethylation, RNA expression etc. are affected by fluoride exposure leading to pain and disability.
https://www.mdpi.com/1422-0067/22/21/11932/htm

- Qiao L, Liu X, He Y, Zhang J, Huang H, Bian W, Chilufya MM, Zhao Y, Han J. Progress of Signaling Pathways, Stress Pathways and Epigenetics in the Pathogenesis of Skeletal Fluorosis. International Journal of Molecular Sciences. 2021; 22(21):11932.

DEPRESSION: Animal study finds negative changes in brain structure and behavior with exposure to sodium fluoride (NAF). https://pubmed.ncbi.nlm.nih.gov/34735150/

- Zhou G, Hu Y, Wang A, Guo M, Du Y, Gong Y, Ding L, Feng Z, Hou X, Xu K, Yu F, Li Z, Ba Y. Fluoride Stimulates Anxiety- and Depression-like Behaviors Associated with SIK2-CRTC1 Signaling Dysfunction. J Agric Food Chem. 2021 Nov 4. PMID: 34735150.

2020

AMERICAN FETAL EXPOSURE: Study on pregnant women in California and Montana find, "Fluoride concentrations in urine, serum, and amniotic fluid from women were positively correlated to public records of community water fluoridation" and that concentration is consistent with findings of Canadian studies that find these concentrations are associated with increased learning disabilities and lower IQ in offspring.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7132865/

- Abduweli Uyghurturk D, Goin DE, Martinez-Mier EA, Woodruff TJ, DenBesten PK. Maternal and fetal exposures to fluoride during mid-gestation among pregnant women in northern California. Environ Health. 2020 Apr 6;19(1):38.

BLOOD: Canadian Health Measures Survey (CHMS) collects extensive biomonitoring data used to assess the exposure of Canadians to environmental chemicals finds higher fluoride in urine associated with significantly higher blood lead, urinary lead, etc. Also finds urinary selenium is significantly lower in fluoridated Canadian communities, "this is the first study where biomonitoring data from multiple cycles of CHMS were combined in order to generate robust estimates for subsets of the Canadian population. Such assessments can contribute to a regional-level prioritization of control measures to reduce the exposure of Canadians to chemicals in their environment."
https://www.ncbi.nlm.nih.gov/pubmed/31972364?dopt=Abstract

- Valcke M, Karthikeyan S, Walker M, Gagné M, Copes R, St-Amand A. Regional variations in human chemical exposures in Canada: A case study using biomonitoring data from the Canadian Health Measures Survey for the provinces of Quebec and Ontario. Int J Hyg Environ Health. 2020 Jan 20;225:113451.

THYROID & IQ: Concentrations of fluoride in drinking water considered optimal and safe in the US result in altered thyroid function and lowered IQ in Chinese children.
https://www.sciencedirect.com/science/article/pii/S0160412019301370

- Wang M, Liu L, Li H, et al.Thyroid function, intelligence, and low-moderate fluoride exposure among Chinese school-age children. Environment International. Volume 134, January 2020.

OVERDOSED CANADIAN BABIES: MIREC study documents Canadian bottle-fed babies have lower IQ in optimally fluoridated communities while breast fed babies have extremely low F and significantly higher IQ. https://www.sciencedirect.com/science/article/pii/S0160412019326145

- Till C, Green R, Flora D, Hornung R, Martinez-Miller EA, Blazer M, Farmus L, Ayotte P, Muckle G, Lanphear B. Fluoride exposure from infant formula and child IQ in a Canadian birth cohort. Environment International. 2020.

BIASED NARRATIVES: Canadian researchers comment on "expert" attacks on the high quality studies that contradict the dental CWF narrative, i.e. political suppression of scientific facts.
https://www.nature.com/articles/s41390-020-0973-8

- Till, C., Green, R. Controversy: The evolving science of fluoride: when new evidence doesn't conform with existing beliefs. Pediatr Res (2020).

BONE HEALTH: Low to moderate fluoride exposure weakens and damages bones in women.
https://www.sciencedirect.com/science/article/abs/pii/S0147651320308708

- Minghui Gao et al, Association between low-to-moderate fluoride exposure and bone mineral density in Chinese adults: Non-negligible role of RUNX2 promoter methylation. Ecotoxicology and Environmental Safety. Volume 203, 15 October 2020.

BONES: Found an age-specific association between fluoride exposure and altered CALCA methylation in adult women, affecting bone health. https://pubmed.ncbi.nlm.nih.gov/32283421/

- Sun R, Zhou G, Liu L, Ren L, Xi Y, Zhu J, Huang H, Li Z, Li Y, Cheng X, Ba Y. Fluoride exposure and CALCA methylation is associated with the bone mineral density of Chinese women. Chemosphere. 2020 Aug;253:126616.

SEX HORMONES IN FLUORIDATED US: "The data indicated gender- and age-specific inverse associations of fluoride in plasma and water with sex steroid hormones of total testosterone, estradiol and SHBG in U.S. children and adolescents."
https://www.sciencedirect.com/science/article/pii/S0269749119357963

- Bai, R., Huang, Y., Wang, F., & Guo, J. (2020). Associations of fluoride exposure with sex steroid hormones among U.S. children and adolescents, NHANES 2013–2016. Environmental Pollution, 114003

NERVOUS SYSTEM: The enteric nervous system (ENS) is called the second brain and governs the gastrointestinal track. Includes dopamine & serotonin function. Study finds "fluoride exposure during pregnancy and lactation might induce ENS developmental defects."
https://link.springer.com/article/10.1007/s12011-020-02249-x

- Sarwar, S., Quadri, J.A., Kumar, M. et al. Apoptotic and Degenerative Changes in the Enteric Nervous System Following Exposure to Fluoride During Pre- and Post-natal Periods. Biol Trace Elem Res (2020).

ENDOCRINE SYSTEM REVIEW: The endocrine system includes the pineal gland, hypothalamus, pituitary gland, thyroid with parathyroid glands, thymus, pancreas (partial endocrine function), adrenal glands, as well as male and female gonads (testes and ovaries) which are adversely effected by exposure to fluoride.
https://www.sciencedirect.com/science/article/abs/pii/S0045653520317604

- Marta Skórka-Majewicz et al, Effect of fluoride on endocrine tissues and their secretory functions -- review. Chemosphere, Volume 260, December 2020, 127565.

WHO IGNORES KIDNEYS: WHO guidelines of safety below 1.5 ppm fluoride concentration is wrong. "The available guidelines for drinking water are solely based on healthy populations with normal renal function. But, it is evident that once the kidney function is impaired, patients enter a vicious cycle as fluoride gradually accumulates in the body, further damaging the kidney tissue."
https://www.sciencedirect.com/science/article/abs/pii/S0045653520313795

- Shanika Nanayakkara, et al. The Influence of fluoride on chronic kidney disease of uncertain aetiology (CKDu) in Sri Lanka. Chemosphere. Volume 257, October 2020, 127186

PEDIATRIC BONE DISEASE: Identifies fluoride concentrations in water above 1.2 ppm as "dangerously high" that can cause pediatric bone disease. Urine measurements of fluoride in those afflicted are below the fluoride concentrations in women living in optimally fluoridated communities per 2017 Canadian study by Green et al.
https://pubmed.ncbi.nlm.nih.gov/32692054/

- Nipith Charoenngam, Muhammet B Cevik, Michael F Holick. Diagnosis and management of pediatric metabolic bone diseases associated with skeletal fragility. Curr Opin Pediatr. 2020 Aug;32(4):560-573.

EPA ON ENVIRONMENTAL STRESS: EPA authors find that exposure to fluoride has the greatest adverse impact on cognitive ability in children, even more than lead.
https://www.mdpi.com/1660-4601/17/15/5451/htm

- Frances M. Nilsen, Jazmin D.C. Ruiz and Nicolle S. Tulve. A Meta-Analysis of Stressors from the Total Environment Associated with Children's General Cognitive Ability. Int. J. Environ. Res. Public Health 2020, 17(15), 5451.

SOURCE: Compared MIREC, ELEMENT & PROGRESS data. MIREC & ELEMENT differed from PROGRESS in that "daily food and beverage fluoride intake was not associated with CUF in PROGRESS" but study "found that CUF (child urinary fluoride) levels are comparable among children in Mexico City and fluoridated Canadian communities, despite distinct sources of exposure. " https://pubmed.ncbi.nlm.nih.gov/33233802/

- Green, R., Till, C., Cantoral Preciado, A. D. J., Lanphear, B., Angeles Martinez-Mier, E., Ayotte, P., Wright, R. O., Tellez-Rojo, M. M., & Malin, A. J. (2020). Associations between urinary, dietary, and water fluoride concentrations among children in Mexico and Canada. Toxics, 8(4), 1-11. [110].

DENTAL FLUOROSIS & CWF CESSATION: Dental literature review by dentists finds "a significant decrease in the prevalence of fluorosis post cessation or reduction in the concentration of fluoride added to the water supply."
https://pubmed.ncbi.nlm.nih.gov/32598322/

- Nor Azlida Mohd Nor, Kuala Lumpur, Barbara L. Chadwick, Damian JJ. Farnell, Ivor G. Chestnutt. The impact of stopping or reducing the level of fluoride in public water supplies on dental fluorosis: a systematic review. Reviews on Environmental Health. 2020.

2019

SLEEP & PINEAL GLAND: "Chronic low-level fluoride exposure may contribute to changes in sleep cycle regulation and sleep behaviors among older adolescents in the US."
https://ehjournal.biomedcentral.com/articles/10.1186/s12940-019-0546-7

- Malin, A.J., Bose, S., Busgang, S.A. et al. Fluoride exposure and sleep patterns among older adolescents in the United States: a cross-sectional study of NHANES 2015–2016. Environ Health 18, 106 (2019)

ADHD: Youth in optimally fluoridated Canadian communities are almost 3 times more likely to be diagnosed with ADHD and have significantly higher rates of other learning disabilities as compared to their counterparts in non-fluoridated communities on a dose-response trend line.
https://www.sciencedirect.com/science/article/pii/S0160412019315971

- Riddell JK, et al. Association of water fluoride and urinary fluoride concentrations with attention deficit hyperactivity disorder in Canadian youth. Environment International. Volume 133, Part B, December 2019.

ASD: Increased exposure to fluoride is associated with higher incidence of ASD in regions with fluoridated water or endemic fluorosis. Based on biological plausibility and incidence, authors hypothesize that increased fluoride exposure is an environmental risk factor for autism.
https://www.mdpi.com/1660-4601/16/18/3431/htm

- Strunecka A, Strunecky O. Chronic Fluoride Exposure and the Risk of Autism Spectrum Disorder. Int. J. Environ. Res. Public Health 2019, 16(18), 3431.

PRENATAL: Three measurements in high quality NIH sponsored prospective cohort study (MIREC) found significantly lowered IQ in offspring of mostly white, well-educated Canadian women living in 'optimally' fluoridated communities.
https://jamanetwork.com/journals/jamapediatrics/fullarticle/2748634

- Green R, Lanphear B, Hornung R, et al. (2019) Association Between Maternal Fluoride Exposure During Pregnancy and IQ Scores in Offspring in Canada. JAMA Pediatrics. 2019.

KIDNEY & LIVER: Researchers at Mt. Sinai Medical School find American teens in optimally fluoridated American towns have markers for altered kidney & liver parameters that puts them at higher risk for kidney & liver disease as adults.
https://www.sciencedirect.com/science/article/pii/S0160412019309274

- Malin AJ, Lesseur C, Busgang SA, Curtin P, Wright RO, Sanders AP. Fluoride exposure and kidney and liver function among adolescents in the United States: NHANES, 2013–2016. Environment International. August 8, 2019.

GUTS: Animal study on microbiome health and immunity documents fluoride causes serious damage to rectal structure and significantly inhibits proliferation of rectal epithelial cells.
https://www.ncbi.nlm.nih.gov/pubmed/31885060/

- Wang H., Miao C., Liu J. et al. Fluoride-induced rectal barrier damage and microflora disorder in mice. Environ Sci Pollut Res (2019).

TEETH: An analysis of the dental fluorosis data in three U.S. NHANES reports noted that more than half of American teens have fluoride damaged teeth as the result of too much fluoride consumption during childhood. This results in costly cosmetic dentistry in young adulthood for millions as well as increased decay in the more severely affected.
(20% very mild + 15% mild + 28% moderate + 3% severe = 65% afflicted per 2011-12 data)
http://fluoridealert.org/wp-content/uploads/neurath.2019-1.pdf

- Neurath C, Limeback H, Osmunson Bm et al. (2019) Dental Fluorosis Trends in US Oral Health Surveys: 1986 to 2012. JDR Clinical & Translational Research.

ALZHEIMER'S: Even low concentrations of fluoride in drinking water at or below concentrations deemed optimal or safe by the WHO result in a pattern of increased dementia.
https://www.ncbi.nlm.nih.gov/pubmed/30868981

- Russ TC, Killin LOJ, Hannah J, Batty GD. Aluminium and fluoride in drinking water in relation to later dementia risk. The British Journal of Psychology. March 2019.

DNA DAMAGE: Mitochondrial dysfunction associated with dental fluorosis observed in Chinese children with fluoride concentrations in water identified as optimal or safe per U.S. authorities. Gender differences to the fluoride induced oxidative stress also noted.
https://www.sciencedirect.com/science/article/pii/S0160412018326291?via%3Dihub

- Zhou G, Yang L, Luo C, et al. Low-to-moderate fluoride exposure, relative mitochondrial DNA levels, and dental fluorosis in Chinese children. Environment International. Volume 127, June 2019, Pages 70-77.

DEMENTIA: Describes mechanism by which the effectiveness of the two most popular drugs used to treat Alzheimer's & other neurodegenerative dementia disease is reduced or blocked by fluoride. https://www.mdpi.com/1660-4601/16/1/10/htm

- Marta Goschorska, Izabela Gutowska, Irena Baranowska-Bosiacka, Katarzyna Piotrowska, Emilia Metryka, Krzysztof Safranow, Dariusz Chublek. Influence of Acetylcholinesterase Inhibitors Used in Alzheimer's Disease Treatment on the Activity of Antioxidant Enzymes and the Concentration of Glutathione in THP-1 Macrophages under Fluoride-Induced Oxidative Stress. Int. J. Environ. Res. Public Health, 2019, 16(1), 10.

ADULT BRAINS: First long term NaF animal study (10 weeks) using moderate levels of fluoride finds a number of histological changes including in parts of the brain associated with memory and learning. https://www.sciencedirect.com/science/article/pii/S0045653518317508

- Pei Jiang, Gongying Li, Xueyuan Zhou, Changshui Wang, Yi Qiao, Dehua Liao, Dongmei Shi. Chronic fluoride exposure induces neuronal apoptosis and impairs neurogenesis and synaptic plasticity: Role of GSK-3b/b-catenin pathway.Chemosphere. Volume 214, January 2019, Pages 430-435.

DELAYED MALE PUBERTY: This 4th study from the NIH sponsored ELEMENT investigation of the prenatal impact of low-dose prenatal exposure found a significant pattern of delayed puberty for boys associated with maternal fluoride as measured in urine samples. Female data showed non-significant trend towards earlier menarche. More study needed to determine the impact on sexual development. https://www.ncbi.nlm.nih.gov/pubmed/30922319

- Liu Y, Téllez-Rojo M, Hu H, et al. Fluoride exposure and pubertal development in children living in Mexico City. Environ Health. 2019 Mar 29;18(1):26.

ANXIETY & DEPRESSION: Both rats and children experience changes in brain chemistry from extended exposure to fluoride which affects mood. Serotonin and the prefrontal cortex are impacted. Studies that only examine short-term exposure are inadequate to detect these changes which are more pronounced in females.
https://www.sciencedirect.com/science/article/abs/pii/S0031938418309375

- Lu F, Zhang Y, Trevedi A, et al. (2019) Fluoride related changes in behavioral outcomes may relate to increased serotonin. Physiology & Behavior.

EYE DISEASE: Fluoride is a poison that has biological impact on consumers in any dose, contributing to the development of cataracts, glaucoma and macular degeneration.
https://www.mdpi.com/1660-4601/16/5/856

- Waugh DT. The Contribution of Fluoride to the Pathogenesis of Eye Diseases: Molecular Mechanisms and Implications for Public Health. Int. J. Environ. Res. Public Health. 2019, 16(5), 856.

BONES & GENES: This 30 day animal study at 8 mg/L fluoride documents DNA & RNA damage that inhibits gene expression which can be passed on through generations affecting bone development and contributing to weak bones, blood & bone cancers and skeletal fluorosis.
https://www.sciencedirect.com/science/article/pii/S0147651318311734?via%3Dihub

- Atule P. Daiwile, Prashant Tarale, Saravanadevi Sivanesan, et al. Role of fluoride induced epigenetic alterations in the development of skeletal fluorosis. Ecotoxicology and Environmental Safety. Volume 169, March 2019, Pages 410-417.

BRAIN INJURY: Fluoride interferes with calcium metabolism which impacts brain chemistry and poisons the hippocampus. "The imbalance of calcium metabolism caused by fluorosis may be a pathogenesis of brain injury induced by fluoride."
https://www.sciencedirect.com/science/article/pii/S0045653518324007

- Qiuli Yu, Dandan Shao. Rui Zhang, Wei Ouyang, Zigui Zhang. Effects of drinking water fluorosis on L-type calcium channel of hippocampal neurons in mice. Chemosphere. Volume 220, April 2019, Pages 169-175. [Online Ahead of Print]

BRAIN DAMAGE: Prenatal & postnatal animal experiment using 10, 50 and 100 mg/L to simulate human experience documents mitochondrial damage and neuronal death as mechanism that result in learning and memory impairments.
https://www.ncbi.nlm.nih.gov/pubmed/30659323

- Zhao, Q., Niu, Q., Chen, J. et al. Roles of mitochondrial fission inhibition in developmental fluoride neurotoxicity: mechanisms of action in vitro and associations with cognition in rats and children. Arch Toxicol (2019).

IODINE: Identifies and discusses the biochemical and hormonal impact of fluoride and fluoridation policy on iodine metabolism with consideration of related neurodevelopmental and pathological disorders. https://www.mdpi.com/1660-4601/16/6/1086

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BIOLOGY OF POISON: Deep dive into the biological impact of fluoride that affects metabolism, hormones, immune function, etc. “Moreover, the findings of this study further suggest that there are windows of susceptibility over the life course where chronic F exposure in pregnancy and early infancy may impair Na+ , K+ -ATPase activity with both short- and long-term implications for disease and inequalities in health.” https://www.mdpi.com/1660-4601/16/8/1427

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MITOCHONDRIA: Prenatal and postnatal exposure to fluoride results in mitochondrial abnormalities, autophagy and apotheosis contributing to neuronal death. https://www.NCBI.nlm.nih.gov/pubmed/30659323

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NUTRITION: The f-ion is a poison but the bioavailability of CaF is different than NaF as calcium is the antidote to fluoride poisoning. In addition to being in water and dental products, 20% of pharma and 40% of agrichemicals have a fluoride base. Consequently, people are exposed to excessive amounts of fluoride which contributes to chronic disease. https://journals.matheo.si/index.php/ACSi/article/view/4932/2095

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THYROID: Even 0.5 ppm fluoride in water has an adverse impact on thyroid hormones. Water is currently fluoridated to 0.7 ppm, a reduction from up to 1.2 ppm in 2015. https://www.NCBI.nlm.nih.gov/pmc/articles/PMC5805681/

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OVERDOSED BABIES: Over one third of babies (37%) in fluoridated American communities consume amounts of fluoride in excess of the upper limits of fluoride considered safe per government regulations. Even 4% of babies in non-fluoridated communities are overdosed on fluoride due to consumption of products made with fluoridated water. At the very least, this puts these children at high risk for developing dental fluorosis. Dental fluorosis is associated with increased incidence of learning disabilities, broken bones and kidney disease.
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GOVERNMENT BIAS: A National Toxicology Program animal experiment studying the impact of fluoride consumption used the wrong rats, the wrong dose, and the wrong study design in order to manufacture a finding of no prenatal or postnatal effect.
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PREGNANT WOMEN: Pregnant Canadian women drinking 'optimally' fluoridated water had twice the fluoride exposure per individual testing as compared to pregnant women in non-fluoridated Canadian communities - and consistent with the range in the Mexican women in the ELEMENT cohort whose children had up to 6 points lowered IQ based on prenatal exposure to fluoride (from salt). The Canadian study excluded those with health conditions such as kidney disease as well as considered confounding factors such as tea consumption.
https://ehp.niehs.nih.gov/doi/pdf/10.1289/EHP3546

- Christine Till, Rivka Green, John G. Grundy, Richard Hornung, Raichel Neufeld, E. Angeles Martinez-Mier, Pierre Ayotte, Gina Muckle, and Bruce Lanphear. Community Water Fluoridation and Urinary Fluoride Concentrations in a National Sample of Pregnant Women in Canada. Environmental Health Perspectives. October 2018.

LEARNING DISABILITIES: Over 200 children were individually tested. Study found attention deficit disorder apparently caused by their prenatal exposure to fluoride specific to dose. This is the 3rd report out of the NIH sponsored 12 year ELEMENT project that has confirmed low dose prenatal exposure to fluoride consistent with exposure in 'optimally' fluoridated communities causes subtle but permanent brain damage for many consumers. Excluded those with history of mental illness or conditions such as diabetes and renal disease.
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ALZHEIMER'S DISEASE: Describes impact of fluoride-induced stress and inflammation in the development of Alzheimer's disease and demonstrates the mechanism for cell death in its worsening over time. https://www.mdpi.com/1422-0067/19/12/3965

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CANCER: Researchers who include an IARC scientist find esophageal cancer is 9.4 times more prevalent among those with dental fluorosis in the endemic fluorosis regions of Kenya. Provides biological plausibility that inflammatory fluoride affects microbiome and other biological mechanisms. Recommends more study. https://www.ncbi.nlm.nih.gov/pubmed/30582155/

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KIDNEYS: Fluoride is a common exposure that is selectively toxic to the kidneys. https://www.sciencedirect.com/science/article/pii/S0270929518301827

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IQ & DF: Between 0.5 and 3.9 mg/L, found every 0.1 mg/L increased dental fluorosis by 2.24% and every 0.5 mg/L decreases IQ by 2.67 points. Also found half as many kids with high IQ children with higher F- dose. https://www.NCBI.nlm.nih.gov/pubmed/29870912

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2017

REVIEW: Concludes that fluoridation schemes whether from water, food or salt programs “pose risks of various diseases in the asthmatic-skeletal, neurological, endocrine and skin systems. Dental and skeletal fluorosis are signs of chronic and excessive ingestion of fluoride.” https://www.NCBI.nlm.nih.gov/pubmed/28453591

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DOSE-RESPONSE: Validated that IQs of children are lowered on a dose-response trend line correlated with the amount of fluoride exposure as measured via urine tests of their mothers during pregnancy and individualized IQ tests of offspring. In the range consistent with doses in optimally fluoridated communities, there was up to a 6 point difference in IQ. This NIH sponsored 12 year longitudinal study conducted by researchers at world class American & Canadian universities excluded diabetics as well as those with kidney disease or pregnancy complications and allowed for many confounders. https://www.sciencedirect.com/science/article/pii/S016041201830833X

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IQ & DF: Every 0.1 mg/L increased dental fluorosis by 2.24% and Every 0.5 mg/L decreases IQ by 2.67 points. There are half as many high IQ children in higher fluoride dose group. https://www.NCBI.nlm.nih.gov/pubmed/29870912

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GENES & BONES: "This study provides evidence that chronic oxidative and inflammatory stress may be associated with the fluoride-induced impediment in osteoblast differentiation and bone development." http://link.springer.com/article/10.1007/s12011-016-0756-6

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- Martinez-Mier EA, Spencer KL, Sanders BJ, Jones JE, Soto-Rojas AE, Tomlin AM, Vinson LA, Weddell JA, and Eckert GJ. Fluoride in the diet of 2-years-old children. Community Dent Oral Epidemiol. 2017;00:1–7.

APOPTOSIS: "Enamel fluorosis is a developmental disturbance caused by intake of supraoptimal levels of fluoride during early childhood.The enamel defects consist of horizontal thin white lines, opacities (subsurface porosities), discolorations, and pits of various sizes. The molecular mechanism underlying enamel fluorosis is still unknown..... We can hypothesize that fluorosis is due to a combination of direct cytotoxic effects causing cell death, the delayed development of tight junctions, which are necessary to form a sealed barrier between apical and basolateral surfaces, and a direct inhibitory effect of fluoride on vectorial calcium and/or bicarbonate transport." https://www.NCBI.nlm.nih.gov/pmc/articles/PMC5770627/

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DNA: Finds that "prolonged fluoride intake at chosen concentrations caused imbalance of the cellular oxidative state, affected DNA and disrupted cellular homeostasis… It is recommended that fluoride supplementation requires a fresh consideration in light of the current study."
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IMMUNITY: Prenatal and early postnatal exposure to fluoride impairs spleen function and development which damages spleen and lifelong immunity.
https://www.NCBI.nlm.nih.gov/pubmed/28846973/

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NEUROINFLAMMATION: Toxic effects of fluoride on the central nervous system and immunity.
https://link.springer.com/article/10.1007/s10753-017-0556-y

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2016

CRITIQUE HHS RECOMMENDATION: Pro-fluoridation team of dental researchers determined that the Department of Health and Human Services reduction of the optimal fluoride concentration to a single 0.7 ppm target is lacking in sound science, i.e. that "policy need to be cognizant of the balancing of risk and protective exposures across the entire population and potentially all ages and to be based on recent data that are purposefully collected, critically analyzed and carefully interpreted… (the recommendation seems) premature in terms of its rationale and its use and interpretation of sometimes dated data." These authors' bias is to maintain 1 ppm; nevertheless, their rationale against the HHS document is appropriate. The HHS document is political, not scientific.
https://www.NCBI.nlm.nih.gov/pubmed/26710669

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OSTEOPOROSIS: "Consequently, although the World Health Organization continues to support F schemes for caries prevention despite a lack of scientific proof, the F schemes are not able to improve the crystal quality but rather contribute adversely to affect tooth development and increases the risk of developing postmenopausal osteoporosis."
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DIABETES: Fluoridation policy significantly increases incidence of age related type 2 diabetes.
https://www.NCBI.nlm.nih.gov/pubmed/27740551

- K. Fluegge. Community water fluoridation predicts increase in age-adjusted incidence and prevalence of diabetes in 22 states from 2005 and 2010. Journal of Water and Health, 2016.

IBD: Crohn's disease and ulcerative colitis increases after fluoridation begins in multiple countries. http://www.NCBI.nlm.nih.gov/pubmed/27199224

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2015

COCHRANE CWF REVIEW: Estimates that 12% of the children living in fluoridated communities with 0.7 ppm fluoridation have aesthetically objectionable dental fluorosis with a total dental fluorosis effect of 40%. The effects were 47% & 15% for 1 ppm, only a minor impact on incidence of dental fluorosis and consistent with the findings of the 2000 York Review.
http://www.cochrane.org/CD010856/ORAL_water-fluoridation-to-prevent-tooth-decay

- Iheozor-Ejiofor Z, Worthington HV, Walsh T, O'Malley L, Clarkson JE, Macey R, Alam R, Tugwell P, Welch V, Glenny A. Water fluoridation for the prevention of dental caries. Cochrane Database of Systematic Reviews 2015, Issue 6.

THYROID: Diagnoses of low thyroid significantly higher in 'optimally' fluoridated regions. https://www.NCBI.nlm.nih.gov/pubmed/25714098

- S Peckham, D Lowery, S Spencer. Are fluoride levels in drinking water associated with hypothyroidism prevalence in England? A large observational study of GP practice data and fluoride levels in drinking water. J Epidemiol Community Health. 24 February 2015.

ADHD: Researchers found there are between 67k and 131k more 11 year olds with ADHD in fluoridated regions of the U.S.
http://www.ehjournal.net/content/pdf/s12940-015-0003-1.pdf

- A Malin and C Till. Exposure to fluoridated water and attention deficit hyperactivity disorder prevalence. Environmental Health 2015, 14:17

CWF INFLAMMATIONS: Found that "even in small concentrations fluoride changes the amounts and activity of COX-1 and COX-2 enzymes taking part in the initiating and development of inflammatory process."
http://www.sciencedirect.com/science/article/pii/S0887233315001605

- I. Gutowskaa, et al. Fluoride as a factor initiating and potentiating inflammation in THP1 differentiated monocytes/macrophages. Toxicology in Vitro. Volume 29, Issue 7, October 2015, Pages 1661–1668.

NEUROTOXICANT: EPA scientists classify fluoride as a 'gold standard' developmental neurotoxicant with substantial evidence of harm.
http://www.sciencedirect.com/science/article/pii/S0892036215300362

- William R. Mundy, Stephanie Padilla, Joseph M. Breier, at al. Expanding the test set: Chemicals with potential to disrupt mammalian brain development. Neurotoxicology and Teratology. Volume 52, Part A, November–December 2015, Pages 25–35.

NOT COST EFFECTIVE: Reveals errors in cost-benefit analysis (CBA) used by CDC. Best case scenario after corrections is a $3 benefit which is more than wiped out by any consideration of dental fluorosis. Fluoridated drinking water results in an economic loss to communities. http://www.NCBI.nlm.nih.gov/pubmed/25471729

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Additional items of note:

2017 IAOMT Position Paper: https://iaomt.org/iaomt-fluoride-position-paper-2/
2018 Open Letter: http://www.multibriefs.com/briefs/icim/nutrition.pdf
2019 Children's Health Defense Statement: https://childrenshealthdefense.org/news/u-s-water-fluoridation-a-forced-experiment-that-needs-to-end/
2020 Expert Opinion: https://www.ehn.org/fluoride-and-childrens-health-2648120286.html

"…fluoride is presumed to be a cognitive neurodevelopmental hazard to humans…"
- Draft Monograph from National Toxicology Program, "Systematic Review of Fluoride Exposure and Neurodevelopmental and Cognitive Health Effects" (Sept 6, 2019)

Fluoridation policy poses a hazard to an unsuspecting public

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DEFINITIONS:

- **Endorsement**: An endorsement is an authoritative statement reflecting a point of view for the purpose of exerting influence. An endorsement is ***not*** an expert opinion.
  - **Authoritative statement:** An opinion that interprets a rule, law or policy for the purpose of guiding, influencing, or mandating action. Authoritative statements are not inherently trustworthy or reliable, but they are inherently manipulative. "Testimonial propaganda" utilizes authoritative statements in marketing and in politics. The slogan "question authority" was intended to encourage critical thinking in order to combat the blind acceptance of biased authoritative statements that endorse policy and/or sanctioned narratives. (*Logical Fallacies: Appeal to Authority*)
- **Expert Opinion**: An expert opinion is dependent on evidence and the due diligence of someone with substantial study in a field. The Daubert Standard is a legal process that validates the trustworthiness of experts offering opinion in a court of law.

EXAMPLES:

ENDORSEMENT: The April 2015 HHS statement recommending 0.7 ppm fluoride concentration in drinking water for 'safe & effective' prevention of tooth decay promoted the long standing fluoridation policy of the agency.

vs.

EXPERT OPINION: The June 2015 Cochrane report finds no reliable evidence of dental benefit to adults or low income children, but documents substantially higher rates of dental fluorosis, some of which will likely result in costly cosmetic dentistry.
The 2019 National Toxicology Program systematic review offered an expert opinion based on the evidence that fluoride is a presumed hazard to human health specific to neurotoxic impact when exposure is pre- or post-natal.