

SESSION 9

Discussion on WATER FLUORIDATION: RISKS AND BENEFITS

Webinar chaired by Pamela den Besten and Sylvie Babajko

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Thousands of studies show the beneficial effects of sodium fluoride on enamel mineralization and caries prevention. However, many experimental and epidemiological studies have raised concerns about its neurotoxicity. This session aims to extend the discussion of sodium fluoride (NaF) beyond enamel benefits to broader health and neurodevelopmental implications.

Bruce A. Dye, DDS, MPH



University of Colorado School of Dental Medicine, USA



Dr. Dye is the Delta Dental of Colorado Foundation Chair in Oral Health Equity and Chair of the Department of Community Dentistry and Population Health. He has held leadership roles at the CDC and NIH/NIDCR, authored over 100 papers, and contributed to the NIH report 'Oral Health in America.'

Dr Dye graduated from the Ohio State University with a DDS degree, earned a master's in public health from the University of Michigan, completed a USPHS Epidemiology Fellowship with training at Johns Hopkins University, and a Dental Public Health Residency at NIDCR. He began his career in USPHS working in Indian Health Service clinics and hospitals. He then worked at CDC's National Center for Health Statistics as the dental epidemiology officer and oral health content lead for the National Health and Nutrition and Examination Survey (NHANES). In this role, he helped to produce several surveillance reports describing oral health status of the US population. Later, he was Dental Epidemiologist and Director of the Health Informatics and Dental Public Health Fellowship at the National Institute of Dental and Craniofacial Research (NIDCR), which was in partnership with the National Library of Medicine (NLM). Dr Dye is an active diplomate on the American Board of Dental Public Health and has received awards for achievement and scientific excellence, including those from the Centers for Disease Control & Prevention, the American Academy of Periodontology, and the American Association for Oral and Craniofacial Research. Dr Dye's research work has focused on the epidemiology of dental diseases and related conditions, research methodology, and public health informatics. He has worked with many investigators, trainees, and students on projects, research studies and learning experiences covering a wide-ranging scope of oral health-related topics across 5 continents. He has published over 100 scientific articles, editorials, and book chapters. Recently, he was the project co-Director & Scientific Editor for the NIH report – Oral health in America: Advances and Challenges – the follow-up report to the 2000 Surgeon General Report on Oral Health in America.

Prof. Marília Afonso Rabelo Buzalaf

Bauru School of Dentistry, University of São Paulo, Brazil



Dean and Professor of Biochemistry and Cariology. Her research focuses on fluoride metabolism, toxicity, and mechanisms of action. Author of 500+ papers and 5 books with over 10,000 citations (h-index 50). Recipient of IADR Basil Bibby and H. Trendley Dean awards.

Fluoride: Metabolism, toxicity and mechanisms of action to control dental caries

The rational use of F has been one of the main factors responsible for the decline in caries prevalence over recent decades. However, excessive intake can cause adverse effects, most notably dental fluorosis. This raises a dilemma: how can F be used to maximize caries prevention while minimizing risks? To address this question, it is essential to understand the metabolism and toxicity of F, as well as the mechanisms through which it controls dental caries. A small fraction of ingested F is absorbed in the stomach as HF, while most is absorbed in the intestine in ionic form. The majority is incorporated into hard tissues, and the remainder is excreted in urine in a pH-dependent process. Systemic, metabolic, or genetic conditions that interfere with absorption or excretion may modify fluoride kinetics and the risk of fluorosis. Because of these complexities, the optimal level of exposure that provides maximum caries protection with minimal fluorosis risk is still uncertain. Dental fluorosis develops when excessive F is ingested during tooth formation, while the anticaries effect results mainly from its local action in liquid phases the oral environment, enhancing remineralization and reducing demineralization. Thus, the rational use of F should consider the different susceptibility windows. Fluoride intake relevant to fluorosis occurs in early childhood (first 3 years of life), while caries prevention requires exposure throughout life. Consequently, policies to reduce fluorosis risk should target early childhood, whereas lifelong F exposure is essential for caries control.

Bruce Lanphear, MD, MPH



Simon Fraser University, Vancouver, Canada

Preventive medicine physician and researcher studying health impacts of lead, fluoride, and toxic chemicals. Co-founder of Little Things Matter and author of the Substack newsletter 'Plagues, Pollutants, and Poverty.'



Bruce Lanphear, MD, MPH, is a preventive medicine physician and professor at Simon Fraser University in Vancouver, British Columbia. For over 30 years, he has studied the health impacts of lead, fluoride, pesticides, and other toxic chemicals. His research helped federal agencies set standards for lead in air, water, and house dust—and led to the conclusion that no level of lead is safe for children.

Bruce has served on science advisory committees for the U.S. EPA, CDC, Health Canada, the Commission for Environmental Cooperation, and the American Academy of Pediatrics. He has testified before the U.S. Congress and the Canadian House of Commons on preventing lead poisoning, and served as an unpaid expert witness in cases involving lead-contaminated communities and fluoride toxicity.

With his brother Bob, Bruce co-founded *Little Things Matter* to make science on toxic chemicals accessible to the public. Together, they produce [videos](#) showing how human health is inseparable from environmental exposures—and why prevention is essential. Bruce also writes a weekly Substack [newsletter](#), *Plagues, Pollutants, and Poverty*, which explores the hidden toll of toxic chemicals on human health.

Prof. Jean-Baptiste Fini, PhD



Muséum national d'Histoire naturelle (MNHN), Paris, France



Professor leading the RODEO team at MNHN/CNRS. His research examines endocrine disruptors and plastic-related compounds affecting health and biodiversity. Contributor to ANSES and EFSA expert panels on endocrine disruptors.

Jean-Baptiste Fini, PhD, is a full professor at the Muséum national d'Histoire naturelle (MNHN) in Paris, France. He works within the Department of "Adaptation of Living Organisms" in a joint research unit with CNRS called "Molecular Physiology and Adaptation." Within this CNRS/MNHN research unit, Prof. Fini leads the RODEO team (Responses to Environmental Challenges). His research focuses on endocrine disruptors and plastic-related compounds, investigating their impact on health and biodiversity, whether as single substances or in mixtures. Dr. Fini is also involved in several expert groups, notably within the French Agency for Food, Environmental and Occupational Health & Safety (ANSES) and the European Food Safety Authority (EFSA), where he contributes to working groups on endocrine disruptors.

Fluoride, the most reactive chemical element, is a halogenated compounds as iodine a major component of thyroid hormones. Thyroid hormone axis disruption can be seen at high doses but questions on endocrine disrupting effects at environmentally relevant doses arise. We will see that available studies show contradictory results, and potential confounding effects such as iodine deficiency complicate the interpretation of thyroid-related outcomes. Evaluations for the potential endocrine-disrupting activity of NaF are ongoing in different reglementary agencies.



Discussion with the Audience

