Water Fluoridation: The Science of Concentration

The concentration of fluoride for water fluoridation is effective in reducing dental caries and safe for total well-being and development across a lifespan. Learn how the adjustment of fluoride in drinking water can be a powerful public health strategy.

How is water fluoridation dose-dependent?

- Like salt, iron, Vitamin D and oxygen, the effect of fluoride depends on the dose or concentration.
- The optimal concentration of fluoride in drinking water is 0.7 mg/L (or 0.7 parts per million).

Isn't fluoride toxic?

- Toxicity is related to dose. While chronically high doses of fluoride could be toxic, the amount in drinking water and other fluoridated products is so low that the toxicity would come from drinking too much water before any effect from the fluoride.
- The single dose of fluoride that could cause acute fluoride toxicity is 5 mg/kg of body weight. If drinking water with 1 mg/L of fluoride, an individual would need to drink five liters of water for every kilogram of body weight.

  An adult male at 155 pounds would need to drink about 93 gallons of water to reach acute fluoride toxicity.

Does water fluoridation affect neurodevelopment?

- No. The best available scientific evidence does not show water fluoridation negatively affecting neurodevelopment, lowering IQ or causing behavioral changes in children.
- The latest, large-scale study from Minnesota demonstrates higher academic performance and cognitive function in children and adolescents in areas with fluoridated water supply.
- This new study stands in contrast to previous studies of fluoride-IQ association, which were conducted in high-fluoride areas that exceeded the WHO guideline of 1.5 mg/L concentrations.

The largest population study of fluoride and cognition found that childhood exposure to fluoride at typical levels of community water fluoridation is associated with modestly better cognitive performance with no harm to cognitive functioning in adulthood.

Does fluoride affect the gut microbiome?

- No. The best available scientific evidence does not show optimal water fluoridation affecting the gut microbiome.
- A 2025 systematic review found gut microbiome changes only in chronically high doses of fluoride, over 2 mg/L.
- Fluoride affects the oral microbiome by interfering with enzymes involved in glycolysis, preventing bacterial energy production, inhibiting the growth of caries-causing bacteria like Streptococcus mutans and reducing synergy between caries-causing bacteria and oral fungi.
- The levels of fluoride that ultimately reach the gut through swallowing and via the blood stream is too low to cause any such effects in the gut.

Learn more about fluoride, fluoridation and public health resources at **cda.org**.

Scan Here