

FURTHER FOLLOW-UP ON FLUORIDE AND FERTILITY

ABSTRACT: A paper by Sun et al. in this issue of *Fluoride* breaks new ground in our understanding of how the fluoride ion may adversely affect male fertility by interfering with spermatogenesis, sperm motility, and the acrosome reaction. These findings add to the pressure for a paradigm shift with respect to community water fluoridation.

Keywords: Community water fluoridation; Fertility; Fluoride; Paradigm shift.

A paper by Sun et al.¹ in this issue of *Fluoride* breaks new ground in our understanding of how the fluoride ion (F) may adversely affect male fertility. Using iTRAQ-based comparative proteomics techniques to detect global changes in the protein profiles of testis in male mice after exposure to F in drinking water, the authors found F exposure may interfere with spermatogenesis, sperm motility, and the acrosome reaction. The suggested mechanisms involved adversely affecting ubiquitination, phosphorylation, retinoic acid synthesis, histone-protamine replacement, and the sperm acrosome membrane.

Clearly, F may adversely affect male fertility.^{2,3} The dose at which this occurs is a relevant question. Corresponding to the impaired *in vivo* fertility found in rats, chinchillas, alligators, caimans, and horses drinking water with 1 mg F/L,² impairment in humans may possibly occur at a similar dose of approximately 1.1 mg F/day (an adult water intake of 1.1 L/day with 1 mg F/L).⁴ Applying an uncertainty factor (UF) of 10 would give a safe dose of approximately 0.11 mg F/day. This is higher than the safe dose calculated to give protection for children from developmental neurotoxicity of 0.045–0.047 mg F/day,⁴ partly because an UF for *in utero* exposure is not required. An intake of 0.11 mg F/day would occur with drinking 1.1 L of water with 0.1 mg F/L. With F also being contained in the diet, e.g., with tea drinking, there is no room to safely add additional F to potable water supplies.^{2,4,5} Although the only assuredly safe potable water F level is zero, the 1939 recommendation by Babbitt and Doland that the maximum level of F in drinking water should be 0.1 mg/L still has merit as a practical goal to aim for.⁶

The findings of Sun et al.¹ add to the pressure for a paradigm shift with respect to community water fluoridation.⁷ The failure of those promoting the extension of community water fluoridation to acknowledge the adverse effects of F on health, such as those on fertility, brain development, glucose metabolism, the musculoskeletal system, the G-I tract, and thyroid function, indicates that tardive photopsia still abounds.^{4,5,7}

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