

NEUROTOXICITY OF FLUORIDE

The August 1995 issue of this journal contained an abstract (pages 151-152) of an interesting paper by Dr Phyllis Mullenix and her collaborators.¹ They recorded behavioral changes in rats after ingestion of fluoride, and found that the severity of the effect on behavior increased directly with plasma fluoride levels and fluoride concentration in specific brain regions. A reading of the full paper is well worthwhile. In their Introduction, after referring to the increase in dental fluorosis in humans after decades of water fluoridation, the authors comment:

"One concern that has not been fully investigated is the link between fluoride and effects on the central nervous system (CNS)... Many years of ubiquitous fluoride exposure have not resulted in obvious CNS problems such as seizures, lethargy, salivation, tremors, paralysis, or sensory deficits. Still unexplored, however, is the possibility that fluoride exposure is linked with subtle brain dysfunction."

The carefully designed animal experiment which they report revealed subtle but very real changes in behavior patterns following fluoride ingestion: hyperactivity after prenatal exposure, and cognitive deficits after weanling and adult exposure. Fluoride accumulation in important regions of the rat brain, especially the hippocampus, was found to increase as the drinking water fluoride levels increased. These effects, and the sex differences observed, corresponded to those observed in other studies of hippocampal brain damage.

The authors point out that the plasma fluoride levels recorded in the rats were the same as those sometimes recorded in humans - for example, in children one hour after receiving topical fluoride treatment of their teeth. In their conclusion calling for further rat and human studies they state:

"Experience with other developmental neurotoxicants prompt expectations that changes in behavioral function will be comparable across species, especially humans and rats. Of course behaviors per se do not extrapolate, but a generic behavioral pattern disruption as found in this rat study can be indicative of a potential for motor dysfunction, IQ deficits and/or learning disabilities in humans."

The authors draw attention to reports from Chinese investigators that high levels of fluoride in drinking water (3-11 ppm) affect the central nervous system directly without first causing the physical deformations of skeletal fluorosis.²⁻⁴ Readers of *Fluoride* will recall the recent (November 1995) research report from China indicating adverse neurological effects on the brain from fluoride exposure.⁵ This work also suggested that children with dental fluorosis are at greater risk of decreased mental acuity. One can only wonder whether the effects of fluoridated water might extend beyond the appearance of the teeth and include neurotoxicity among children afflicted with dental fluorosis.

Some of our readers may recall also pertinent early clinical findings reported by our founding editor, Dr G L Waldbott, of which Dr Mullenix and her co-workers do not appear to have been aware. These involved a wide range of reversible toxic effects of fluoridated drinking water, including diminished mental acuity and

