Genetic Susceptibility/Resistance to Dental Fluorosis Among Different Mouse Strains

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Fluoridation of community water supplies for the purpose of preventing dental caries remains one of the top ten public health interventions of the last century. However, exposure (ingestion) of greater than optimal amounts of fluoride from a variety of sources has lead to an increase in the prevalence of dental fluorosis. We propose that dental fluorosis represents a complex condition caused by environmental and genetic factors. Objective: To assess the role of genetics in the pathogenesis of dental fluorosis using genetically separate inbred strains of mice. Methods: Twelve strains of mice were treated with 0, 25, and 50 ppm of fluoride in their drinking water. Each mouse was given weekly dental fluorosis evaluations. After 60 days of treatment, intraoral imaging skull and skeletal radiographs were performed. Femurs were collected for fluoride analysis. Mandibular incisors were isolated for quantitative light fluorescence (QLF) studies and fluoride analysis. Results: The responses to fluoride varied between strains from mild, moderate, to severe dental fluorosis. OLF proved to be an innovative tool for the quantitation of dental fluorosis within and between the strains. The A/J strain was found to be most susceptible to develop rapid and severe dental fluorosis, whereas the 129P3/J strain was the most resistant essentially showing no effects. Conclusion: These observations support the role of a genetic component in the pathogenesis of fluorosis.