

Tooth decay affects all age groups. Although preventable, is the most common chronic disease of childhood.<sup>1</sup> Untreated decay can lead to pain and tooth loss and has been associated with difficulty in eating, sleeping, learning, and poor nutrition.<sup>1</sup> An estimated 51 million school hours are lost due to cavities each year, and almost one fifth of all health care expenditures in children are related to dental care.

### **Benefits of Fluoridation**

Fluoride added to community drinking water at the proper concentration prevents tooth decay and benefits everyone in the community, regardless of age or income—including those who do not have access to prevention and treatment services.

A recent study by the Task Force on Community Preventive Services—an independent, non-federal task force—found a 30 percent decrease in childhood decay in communities with fluoridated water. Stopping community water fluoridation was associated with an increase in tooth decay.<sup>2</sup> Adults in fluoridated areas had 27% fewer dental cavities than those in non-fluoridated areas.<sup>3</sup>

### **Cost and Savings**

Water Fluoridation prevents cavities and saves money, for both families and the health care system. In communities with more than 20,000 residents, every dollar spent on fluoridation on average save \$38 in avoided dental bills. In communities with 5,000 or fewer residents, every dollar spent on fluoridation still saves \$5 in avoided dental bills. Over a lifetime, the cost of fluoridation can be less than the cost of one dental filling.<sup>4</sup> Fluoride tablets and drops, rinses and toothpastes are more expensive and less effective than the fluoridation of drinking water.<sup>5</sup>

### **Addressing Safety Concerns**

Fluoride is naturally present in water and food. In Vermont, it is not uncommon to have naturally-occurring fluoride at 0.2 to

0.5 milligrams per liter of water (mg/L). In some areas, well testing has shown levels of fluoride in the same range used for community water fluoridation, and in other areas, test results have been much higher.

Fluoridation of community drinking water involves adjusting the existing natural fluoride concentration in drinking water to a level that is recommended for preventing tooth decay.

The Centers for Disease Control & Prevention, the U.S. Surgeon General, and the Vermont Department of Health support fluoridation of public water supplies because of the public health benefits—while recognizing the possible risks of ingesting too much fluoride.

### **Recommended Fluoride Concentration**

For Vermont, the fluoride concentration in water recommended for preventing tooth decay is 0.7 mg/L.

The federal drinking water standard (maximum contaminant level or MCL) for fluoride in drinking water including naturally-occurring fluoride is 4 mg/L. This is to prevent Stage III skeletal fluorosis, a crippling bone and joint condition. EPA has also set a (non-enforceable) standard called the secondary maximum contaminant level (SMCL) of 2 mg/L. This was set to reduce the cosmetic effects on teeth from enamel fluorosis, which is a discoloration or pitting of the teeth.

### **Risks Associated with fluoride at 1 mg/L**

A systemic review by the University of York, UK assessed the evidence for possible ill effects from fluoridated water. This review did not find a causal association between fluoride in drinking water at 1 mg/L and severe enamel fluorosis, skeletal fluorosis, bone fractures or bone cancer. Water fluoridation is associated with increased occurrence of milder forms of enamel fluorosis.<sup>6</sup>

Enamel fluorosis that can result from drinking fluoridated water appears as a barely noticeable white marking of the outer

tooth enamel that is of no cosmetic or functional significance. In the 2002-2003 *Keep Smiling Vermont Oral Health Survey*, 96 percent of first through third graders had no obvious signs of fluorosis.<sup>7</sup>

Water fluoridation is not the only risk factor for mild fluorosis. Other risk factors are use of fluoridated toothpaste by young children and dietary supplements.<sup>8</sup> Fluoride toothpaste is not recommended for use by children under age 2 without consulting a dentist.

The Vermont Department of Health has concluded that the known benefits of fluoride to prevent or reduce tooth decay and dental fillings outweigh the risk of milder forms of fluorosis. Fluorosis is not considered an adverse health effect by public agencies.

#### **Naturally-occurring fluoride in Vermont**

Naturally occurring fluoride levels of 4 mg/L or more have been found in private wells in Vermont. In fluoridated public water systems, the concentration used is 0.7 mg/L. Because of high levels of fluoride may be present in private wells, the Vermont Department of Health works with physicians and dentists to encourage families with small children to test for fluoride before prescribing fluoride supplements. Fluoride testing is also included in kit C, a standard water test for private wells, available at the Health Department Laboratory. Vermont residents who use the Health Department Laboratory and have a test result over 2 mg/L of fluoride are given information about how to reduce the fluoride levels in their drinking water.

#### **Preventing enamel fluorosis**

An excessive amount of fluoride consumed during tooth development in infancy and childhood can result in a range of changes to the enamel surface of the tooth, broadly termed “enamel fluorosis.” Ingestion of fluoride toothpaste and inadvertent use of fluoride tablets in fluoridated areas have

been associated with the increased risk for enamel fluorosis. Some reports have also raised concern that the amount of fluoride in water used for infant formula may add the possibility of developing enamel fluorosis. The Vermont Department of Health concurs with the CDC the water fluoridated at the optimal level has not shown to cause adverse health effects.

The Vermont Department of Health recommends exclusive breastfeeding of infants up to 6 months of age and then continues breastfeeding until at least 12 months. When liquid concentrate or powdered formula is the primary source of nutrition, it can be mixed with fluoridated water. If parents or caregivers are concerned about the development of mild fluorosis, we suggest a ready-to-feed formula or mixing with fluoride free water.

#### **References**

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