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Sally Smartypants

Professor Marcus

Chemistry 151

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## Fluoridation

Science is constantly being used to better the lives of humans, whether it be for preventative or remedial purposes. One use of science for a preventative purpose is adding Fluoride to drinking water, a process called Fluoridation. Fluoride, which is an ion of the element Fluorine, has been found to be effective in the prevention of tooth decay. Even though Fluoride is effective in preventing tooth decay, there is still some question as to whether or not it should be added to drinking water. In order to decide the effectiveness of Fluoride in drinking water it is beneficial to look at the history, benefits, argued hazards, and cost and payment method of adding Fluoride to a town's water source.

In order to decide on the effectiveness of adding fluoride to a town's water supply it is first important to understand the history of fluoridation. The idea of fluoridation began forming in the 1930's when researchers first realized that fluoride could be used to reduce dental cavities (The History of Community). In 1945, fluoridation was first implemented when Grand Rapids, Michigan began adding fluoride to its public water supply. Shortly after the population of Grand Rapids was exposed to fluoridation The National Academy of Sciences' National Research

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Council conducted a study that compared the Grand Rapids population to a control group. This study found a decline of tooth decay among the Grand Rapids population and declared that fluoridation was safe and beneficial (The History of Community). Not long after the success of Grand Rapids, Fluoridation began being implemented in towns and cities across the United States. Since the introduction of fluoridation in the 1940's the benefits of fluoridation have become more widely known.

Some of the major health problems humans' encounter occur in their mouth. It has been found that tooth decay affects almost 80 percent of U.S. children by the time they reach the age of 17 (Chameides). This is commonly seen in families of low economic standing, where proper dental care for their children is not always a top priority. Though tooth decay itself may not seem like a life threatening problem, untreated tooth decay can lead to serious problems such as heart disease (Chameides). A study that was conducted between 2004 and 2006 found that "adults who spent more than 75 percent of their lifetime living in fluoridated communities had significantly less tooth decay (up to 30 percent less) when compared to adults who had lived less than 25 percent of their lifetime in such communities" (Fluoride in Drinking). This study proved that exposing children to fluoride at a young age can decrease the amount of tooth decay they may endure over a lifetime. The reason fluoride is so effective in the prevention of tooth decay is because it promotes new mineralization, increases resistance to acid demineralization, interferes with the formation of plaque, and increases the rate of maturation in teeth (Lepo). Even though fluoridation has been proven to prevent tooth decay there are still some who argue against it.

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Since the beginning of fluoridation there have been arguments against it, some more genuine than others. One of the first arguments against fluoridation rose in the 1950's during the red scare, a time when many Americans were living in fear of communism. During this time some people feared that fluoridation was actually a communist plot to attack capitalism by poisoning American water supplies (Chameides). Though it is now known that communism is not a risk of fluoridation, at the time it was a serious concern. At present the argued risks of fluoridation are more science and less fear based. A paper published by the State University of New York states that "Symptoms of acute oral fluoride intoxication in humans include severe nausea, vomiting, hyper salivation, abdominal pain, and diarrhea" (Kaminsky). The paper continues on to explain how in severe cases these symptoms can lead to convulsions, cardiac arrhythmias, and coma. Though it takes a dose of 1-5 mg/kg to cause acute toxicity, and 15-30 mg/kg to cause death, some argue that drinking fluoridated water is dangerous. Along with the threat of acute toxicity, fluoride is also known to cause dental fluorosis, which is the discoloration and mottling of teeth, and skeletal fluorosis. There have also been reports that fluoride has caused birth defects and cancer in some exposed humans (Kaminsky). Although some argue that there are health risks, the low cost of fluoridation helps to increase its popularity.

Fluoridation is seen as very cost effective as it is less expensive than the cost of treating tooth decay. It is estimated that the cost of fluoridation in large communities is only \$0.50 per person per year, and only \$3.00 per person per year in small communities (Fluoridation Facts). This is very cost effective as the estimated cost of having a dentist place a single amalgam

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restoration is \$101.94 (Fluoridation Facts). The American Dental Association found that “For most cities, every \$1 invested in water fluoridation saves \$38 in dental treatment costs”

(Fluoridation Facts). Fluoridation not only saves money, but also improves oral health for people who cannot afford a trip to the dentist. Because of this the American Dental Association has claimed that “Fluoridation is a community public health measures that saves money”

(Fluoridation Facts). Even though fluoridation is paid for by the taxpayers, it directly benefits the taxpayers and their family because it is implemented in their communities. Because of this it cannot be argued that taxpayers are paying for something that they are not benefitting from.

Even though fluoridation is now being implemented in many cities across the world there is still some question as to whether or not it is beneficial. The history of fluoridation, along with the known benefits and low cost, all make implementing fluoridation seem like the best alternative. However, the argued risks of fluoridation cause some people to question whether or not it is right to force taxpayers to pay for a process that they may not agree with or think is dangerous. As more and more cities begin implementing fluoridation the risks will be more thoroughly tested, hopefully putting the minds of everyone being exposed to fluoridation at ease, and allowing the benefits of fluoridation to reach a greater percentage of the world’s population.

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