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Letter to the Editor

Decay of Free Residual Chlorine in Drinking Water at the Point of Use

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Dear Editor-in-Chief

Disinfected water at the water treatment plant may be polluted again when the water is being transported. Hence, the water should be protected against the possible pollutions by keeping the disinfectant residues in the transportation line. If chlorine is selected as the disinfectant, it will be added to the water in a way that its residue remains in the line so as to prevent any unpredicted pollution. The term free residual chlorine (FRC) is given to each one of the (HClO), (OCl^-), Cl^- (g) compounds .Due to the following reasons it is better to diminish or removal the concentration of residual chlorine at the point of use.

I. Recent studies show the chlorine in treated water is dangerous to human health and can cause allergic symptoms ranging from skin rash to intestinal symptoms to arthritis. Chlorine in water destroys protective lactic acid bacteria lining the colon, which cooperates and strengthen mucosal immune response against foreign pathogens at the intestine (1). On the other hand, an epidemiological study entitled "chlorination water hardness and serum cholesterol in forty-six Wisconsin communities", demonstrated that serum cholesterol and low density lipoprotein cholesterol levels are significantly higher in chlorinated communities than in non-chlorinated communities (2). In some cases, patients are prevented to consume water that contains FRC.

II. People usually use tap water for daily using, often disinfected by chlorine. Disinfection by-product such as Trihalomethanes (THMs) are formed in the preparation of many foods and drinks, by reaction of FRC with organic compounds in foods and drinks (3).So, it is better that before preparing food and drink, the chlorine is removed from water.

III. FRC prevents to microbial contamination in water distribution system, but when was swallowed, its disinfection effect is unimportant and is considered an additive. So, it is better to remove FRC from drinking water.

IV. The concentration of free residual chlorine at the beginning of water distribution line is higher than that in the rest of the line. In fact, those who live in the vicinity of a water treatment plant receive more FRC in their water (4). It seems that the better way to deal with FRC in the distribution line is to remove it from the delivery path before the water is being consumed by people. In addition, due to the public awareness about the formation of hazard-

ous by-products in water, people are increasingly approaching to the consumption of non-chlorinated water; furthermore, increasing numbers of people are using water treatment devices in their homes to minimize the FRC concentration present in water.

For decay of chlorine there are two methods: 1- Storage of the samples at ambience 2- Storage of the samples in refrigerator. Results indicated that if water samples contain FRC (0.2-0.8mg/l) are maintained in ambience and refrigerator, after 24 hr, FRC will decrease by 62% and 51% respectively. It was observed that FRC in the first method diminished sooner than the second method; this was due mainly to exposure to higher temperature and light.FRC dissociates more rapidly when the water is stored in bottles or containers which have no lid because the chlorine evaporates from the water that it is exposed to the air. However, this condition may also results in polluting the water inadvertently. Hence, it is better to apply bottles or containers at ambience with lid.

Based on the previously conducted studies, the free chlorine concentration gradually decreases over time (5) by storing the chlorinated water. On the other hand, storage of water in refrigerator leads to reduce THMs significantly. In a study by storing tap water in refrigerator in a pitcher without lid, concentration of THMs reducted21%-33% and 57%-63% after 4 and 48 hours respectively (6).The present study tries to provide a solution for removing or decreasing of FRC from drinking water at the point of consumption that is simple, inexpensive and easy for people who concern about the harmful effects of chlorine, but force to use it. Those who are not willing to drink water containing such additives can be helped by applying these simple methods. In addition, those who live in the vicinity of a water treatment plant can decrease FRC before consumption of water by these methods. Besides, by decreasing FRC there is no worry about the formation of hazardous by-products in the foods and drinks.

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