Acanthamoeba in the Domestic Water Supply of Huntington, West Virginia, U.S.A.

W. C. TRZYNA¹, M. W. MBUGUA¹, A. ROGERSON²,

¹Department of Biological Sciences, Marshall University, Huntington, WV, USA; ²College of Science & Mathematics, California State University Fresno, Fresno, CA, USA

Summary. The aim of this study was to determine the prevalence of Acanthamoeba in the domestic water supply in Huntington, West Virginia (U.S.A.) and the factors that may contribute to their presence or absence. One hundred sixty-two one liter tap water samples were collected over eight months. Amoebae in the samples (cysts or trophozoites) were harvested by passively filtering onto 5 µm pore size filters and enriching for amoebae on non-nutrient amoeba saline agar plates seeded with Escherichia coli for cultivation. Thirteen percent of all samples were positive for amoebae and 9.3% were positive for the amoeba of interest, Acanthamoeba. Chlorine levels were determined for samples at the time of collection, yielding a mean level of 1.56 mg l⁻¹ chlorine in the distribution system ca. 8 kilometers from the water treatment plant. Cysts and trophozoites of Acanthamoeba clonal isolates were found to tolerate up to 50 mg l⁻¹ and 4 mg l⁻¹ chlorine respectively. This study showed that Acanthamoeba were present in the domestic water supply in Huntington, WV and although no attempt was made to count cells in liter samples, their frequency of occurrence (9.3%) and failure to be present in all replicates, suggests they were present at background levels of perhaps a few cells per five liters. This is only the second U.S. study to consider amoebae in tap water and is unique since the source water was river water. Acanthamoeba trophozoites and cysts were able to withstand levels of chlorine higher than those typically found in tap water suggesting they may be present in either form in the distribution system. Acanthamoeba are opportunistic pathogens capable of causing eye infections and their presence in tap water is a potential risk factor for susceptible individuals, particularly contact lens wearers who may use tap water to clean lenses and storage cases.

Key words: Amoebic Keratitis, amoebae, tap water, Acanthamoeba, chlorine tolerance.

INTRODUCTION

According to Page (1988), acanthamoebae may be the most commonly encountered genus of naked amoeba in freshwater and soil habitats. Even a few small samples are likely to yield isolates of Acanthamoeba, testament to its prevalence and ubiquity in nature. On rare occasions, some strains of these free-living, bactiverous amoebae, can become opportunistically pathogenic and invade human tissue (Marciano-Cabral and Cabral 2003). The most frequently encountered infection is Amoebic Keratitis (AK), a sight-threatening invasion of the cornea (Seal et al. 1998). The factors that promote invasion of the eye are unknown but contact lens wearers are at most risk possibly because the lens surface, if contaminated,