Don't Drink the Water: The Risk of Viable but Non-Culturable Escherichia coli in Long-Term Water Storage

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This research examined the risk of recurrence of viable but nonculturable (VBNC) Escherichia Coli (E. Coli) in long-term water storage. New research has shown that E. Coli can enter the VBNC state during the process of water treatment. This leads to risk of redevelopment of active E. Coli as the water is used and stored. While research has been done on factors that cause VBNC E. Coli and the risk of short-term recurrence, it has not been extensively studied in terms of long-term water storage. First a summary of the prior research on VBNC E. Coli was presented. Then an experiment was conducted that included inoculating tap water with E. Coli then treating preselected samples with UV light, 0.4% chlorine bleach, and 1% chlorine bleach for disinfection, and storing them in clear bottles for an extended amount of time. Samples were taken from each bottle and plated in order to count colonies of E. Coli as to track the number of bacteria present over time. Allowing for the determination of which treatment method poses the highest risk of recurrence of VBNC E. Coli, and to what extent that risk increases over time. It was found that the UV light disinfection method had the highest number of colonies counted over the course of the study. The UV light disinfection also closely mirrored the rise of colonies seen in the untreated but inoculated sample. This study provides a basis for improving regulations for water treatment to better protect individuals, especially in areas where they are considering UV light as a primary disinfection technique. This study also shows the need for further research on how to prevent and limit the threat of VBNC E. Coli in water storage.

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