Effects of Arsenic on *Janthinobacterium* sp. Isolate #19

Imagine Sayasane, Janessa Stovall, and Sarah Alaei

Abstract

Gram-negative bacteria have an outer membrane that produces membrane enclosed sacs known as outer membrane vesicles (OMVs). OMVs interact with the environment via their cargo, which are typically made up of proteins, nucleic acids, and metabolites, among other things. The mechanisms behind this vesiculation are still relatively unknown, yet studies have shown that environmental stressors can boost outer membrane vesiculation production. *Janthinobacterium* is a genus of Gram-negative bacteria, and the specific strain for this study was isolated from periphyton samples collected from Lake Killarney in Federal Way, WA which has significantly higher arsenic levels than that of other shallow lakes throughout the United States. There is a significant knowledge gap on the *Janthinobacterium* genus, but it does prove to be highly arsenic resistant. To further understand how arsenic may play a role in OMV production within *Janthinobacterium*, we hypothesized that adding the stressor of arsenate (AsV) to the isolate will increase the amount of OMVs produced. *Janthinobacterium* sp. isolate #19 was plated on LB agar with and without AsV (50ug/ml), each grown for 48 hours, weighed, and then centrifuged. The supernatant composed of isolated matrix materials and OMVs were then assessed using a fluoresence-based assay to observe the presence of lipid membranes so that we could quantitate the amount of OMVs present. Conversely, the results show a minute decrease in OMV production when exposed to AsV, hence, negligible enough for the results not to be statistically significant. Because LB medium was used for this experiment, it is plausible that there was counter interaction between phosphate and AsV as they have a similar structure, having the ability to pass through the phosphate transporters of the cell, possibly reducing the amount of AsV uptake. Identical experimental conditions were used on *Pseudomonas fluorescens* which were isolated from the same periphyton samples as the *Janthinobacterium* sp. These results showed a statistically significant decrease in the production of OMVs when grown with AsV, which could indicate that the coping mechanisms for the bacteria living in the periphyton are different. Future exploration in this research might consider a minimal medium with less phosphate to allow more arsenate to enter the cell, which would give a much better picture of how AsV influences OMV production as a stressor.