A Novel Low-Cost Filtration System for Removing Arsenic and Improving Health in Rural Populations

Haque, Ishraq (School: Academic Magnet High School)

Approximately 200 million people worldwide are affected by arsenic-contaminated water for reasons such as drinking tube well groundwater. In 2019, the author created a novel and inexpensive One Step Red Soil Filtration (OSRSF) system for villages in Bangladesh. The goal of this current study was to investigate the long-term biological effects of utilizing the OSRSF with a slight modification of the container to create a more efficient system. After one-year usage, hair and nail arsenic levels of villagers significantly decreased. the percentage of immune cell survival was also improved by using the OSRSF. This result was verified in the laboratory by using the cell viability assay to check how arsenic trioxide and sodium arsenite affect survival for two B-cell lines. Then, an immunofluorescence staining assay revealed how mitochondrial stress was attenuated due to a decrease in the cell death marker Bax caused by the filtration system. Western blot analysis showed caspase-3 protein expression decreased, causing a reduction in immune cell death. Overall, this study presents how an economical filtration system can improve human health and provide clean water for low-income populations.

Awards Won: