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Flow cytometric assessment of the effect of simulated gastric fluid (SGF) on the survival of *Salmonella typhimurium*, *Shigella dysenteriae* and *Shigella flexneri*

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The stomach is considered as the first line of defense against bacterial infection, however during the intake of food or water the pH increases, offering the ideal time for bacterial pathogens to pass through. This study investigated the ability of stationary phase non-acid adapted, diarrhoea causing *Shigella dysenteriae*, *Shigella flexneri* and *Salmonella typhimurium* cells to tolerate an environment mimicking the human stomach. Flow cytometric (FCM) analysis was used to investigate bacterial response to the challenge of simulated gastric fluid (SGF) at varying pH for physiological heterogeneity and survival. FCM established that the SGF challenged bacterial cells, at two inoculum sizes, consisted of a mixture of three sub-populations (intact, stressed, and damaged cells) stained with Propidium iodide (PI) and Thiazole orange (TO). Eighty percent of the bacterial cells suffered partial loss of cell membrane integrity and shifted to the stressed state throughout SGF exposure, up to 180 min. All pathogens were culturable from 60 min of SGF (pH 2.5-4.5) exposure, with growth increasing at inoculum size of 10^2 CFU/ml. A general trend of acid tolerance was seen amongst all three strains, with an increase in culturability occurring after 60 min. We found that non-acid adapted bacteria can activate its tolerance mechanisms and survive throughout low pH SGF exposure, even though the numbers of cells decreases to a certain extent or changes to a stressed state, those that did survive were more resistant to acid challenge. The study foresees a potential increase in diarrheal diseases in immune-compromised individuals that depend on the stomach barrier as protection against bacterial pathogens.

Biography

Atheesha Singh has completed her PhD from the University of KwaZulu-Natal and currently pursuing Postdoctoral studies at the University of Johannesburg, South Africa. She has published and presented several papers in reputed journals and international conferences.

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