

The Survivability of Bacteria in Acidic Environments

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This study was performed to determine if bacteria are able to survive in acidic environments for extreme lengths of time. Seeing as how bacteria have a known mutualistic relationship with humans by assisting with processes such as food fermentation and ubiquitous gastric commensals (Cotter, 2003), the bacteria should be able to pass through the stomach into the rest of the gastrointestinal tract. The average pH of stomach acid ranges from 1.5 when hungry to 5 a few hours after eating (Kong, 2008). Would any bacteria be able to survive the lowest average pH of the stomach and pass into the intestines? An overnight culture of *Escherichia coli* in trypticase soy broth was cultured in an agitating incubator set at 37° C at 180 rpm for 24 hours. To determine the original number of bacteria, 2mL of broth and 2mL of 85% saline was serial diluted to 10⁻⁴, ⁻⁵, ⁻⁶ concentration and plated on a Petri dish of trypticase soy agar giving three replications of each. Then 2mL of this broth culture was placed in 2mL of either hydrochloric acid with a pH of 0.75 or 85% saline with two replications. These solutions were then left for three days in the agitating incubator set at the same settings. After this time frame, the acid and saline solutions were diluted and plated the same as the original broth culture with three replications of each. These plates were left in a 37° C incubator for 24 hours during which each plate grew various numbers of colonies with no difference between the acid or the saline. These results show that *E. coli* can survive for periods of time in acidic environments and can pass into the intestines without being compromised.

Key Words:

Bacteria, *Escherichia coli*, hydrochloric acid, survivability, serial dilution, stomach

References

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