Alginate-Based Gel Particle as a Novel Drug Delivery Vehicle for Curcumin

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As more and more hydrophobic compounds are turned away each year due to the fact that the cannot dissolve in the human body, the goal of this project was to a novel alginate-based drug delivery vehicle for curcumin in such a way that the particle could be metabolized by the body, unlike most other particles, and to provide a system that had anti-bacterial properties. It was hypothesized that if the curcumin:CTAB alginate gel particle was given to bacteria such as S. aureus or E. coli, then bacterial growth would be inhibited. The curcumin was iso- lated from turmeric at a local chemistry laboratory. The critical micelle concentration of cetyltrimethylammonium bromide (CTAB) was determined at another local chemistry laboratory. Different curcumin dilutions were then pre- pared utilizing the data obtained from the critical micelle concentration. Then cloud point titration was performed on each of the curcumin dilutions and a CTAB (1.25 mM) solution. Then these solutions were pipetted into a S. aureus suspension and an E. coli suspension. When an analysis of variance (ANOVA) was performed on optical density values for S. aureus after 6 hours and after 24 hours, the p-value was found to be less than 0.05 meaning that the results were significant. When an ANOVA was performed on optical density values for E. coli after 6 hours, the p-value was found to be 1.22E-2; however, when an ANOVA was performed on optical density values for E. coli after 24 hours, the p-value was found to be 0.250. Therefore it was concluded that the novel curcumin:CTAB alginate gel particle had anti-bacterial effects and that surfactant charge played a role in bacterial inhibition.

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