

عنوان مقاله:

Controlled Release of Curcumin by Graphene Oxide/Chitosan/Sodium Alginate Hydrogel Multilayer Nanocomposites and Evaluate its Synergistic Antibacterial Activity

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خلاصه مقاله:

Curcumin has many medical properties, such as anti-inflammatory, anti-microbial, antioxidant, and anti-tumor activities. However, its hydrophobic nature results in less solubility and fast metabolism. Nowadays, designing a cargo based on nano-biotechnology is an efficient method to overcome these limitations of curcumin. This study synthesized graphene oxide/chitosan/sodium alginate (GCA) multilayer nanocomposites according to a layer-by-layer (LBL) assembly to load curcumin. Firstly, for graphene oxide/chitosan (GC) nanocomposite synthesis, graphene oxide (G) suspension was added to the chitosan (CS) solution dropwise during stirring. Then, sodium alginate (A) in water was added to the GC suspension drop wisely, centrifuged, and lyophilized. This GCA multilayer nanocomposite showed a layered structure with negative zeta potential. Though the drug loading efficiency of this GCA multilayer was not as high as graphene oxide, its curcumin release was pH-dependent. The highest drug release belonged to GCA due to the presence of curcumin in the hydrogel network without tight binding. This release was pH-dependent as the curcumin release after ۲۴ h was ۸۰% in pH ۵ for GCA, while this amount was ۶۰ % in pH ۷ because of hydrogel network disruption in the acidic environment. The antibacterial results exhibited that this GCA multilayer did not show any antibacterial activity. It was significant that curcumin did not affect E. coli, though the minimum inhibitory concentration (MIC) for S. aureus was ۳۰۰ µg/ml. Ciprofloxacin has been used to investigate the effect of GCA nanocomposite's synergetic release of curcumin and antibiotics. Results showed that ciprofloxacin increased the inhibition zone diameter for S. aureus, but this was not observed in E. coli. Overall, it can be concluded that the antibacterial activity of curcumin is not evitable. To explain this, the antioxidant activity of curcumin, which reduces the .radicals due to ciprofloxacin activity, can be considered

کلمات کلیدی:

Antibacterial activity, Curcumin, Drug loading, Hydrogel multilayer

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